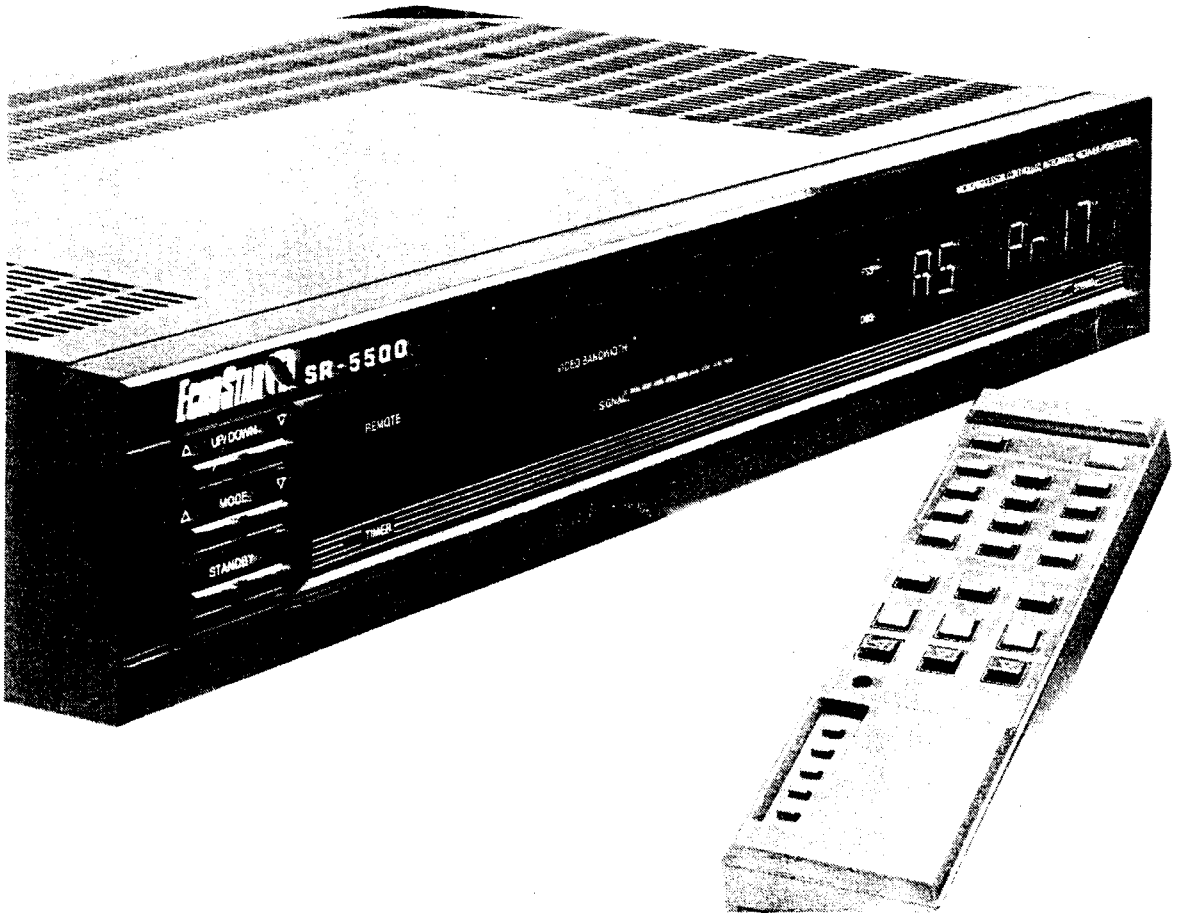
ECHOSTAR SR-5500

Integrated Satellite Receiver/Antenna Positioner

Technical Service Manual



ECHOSPHERE INTERNATIONAL

SECTION 1

Purpose / Scope

This manual has been written to accommodate both the trained electronics technician and those whose level of expertise is not quite up to component level troubleshooting. It contains 4 sections and 5 appendices and discusses the Echostar SR-5500 satellite receiver.

Section 1 contains safety information and the purpose and scope of the manual. Sections 2 and 3 are meant to be used together. Section 2 has block diagrams for the major subassemblies, and section 3 contains flowcharts and disassembly instructions for the replacement of all major subassemblies. Section 4 begins the in-depth circuit analysis. It takes the functional descriptions from section 2 and expands upon them to a component level.

Appendix A lists the adjustment points in the receiver, and Appendix B illustrates pin-outs for some of the most widely used chips in the receiver. Appendix C has component location charts for the major subassemblies, Appendix D has general unit specifications, and Appendix E contains a parts list. An in-depth explanation of each section or appendix can be found at the beginning of the particular section or appendix.

This manual is not meant to be a complete guide for troubleshooting all malfunctions which may arise or all situations that may be encountered, but should be used as a reference for the electronics technician with the proper equipment. The equipment necessary to safely and properly troubleshoot the receiver can be found at the beginning of each alignment procedure located in Appendix A. It is important that all safety information located in the first section of this manual be followed in order that damage to the equipment may be prevented and the technician remain safe. Certain portions of the Echostar SR-5500 (namely the switching power supply) contain high voltages and can present a shock hazard to the technician. The power supply should be changed as a sub-assembly and is so treated in this service manual.

Since this manual contains information on how to troubleshoot and repair the receiver, it should be understood that any repairs or adjustments made on equipment still in warranty could result in the warranty being voided. Due to this, any repairs to be made on in-warranty equipment should be accomplished by one of Echosphere's authorized warranty repair centres.

Table of Contents

Section 1
Purpose/Scope 2
Safety 3

Section 2
System Description 5
Overall Description 5
Video 7
Audio 7

Section 3
Troubleshooting/Board Removal & Installation Instructions 10
Troubleshooting Flowcharts 11
Power Supply Removal/Installation 21
Front Panel and CPU/Display Removal/Installation 22
Tuner Removal/Installation 23
A/V Board Removal/Installation 24
Relay Board Removal/Installation 25
RF Modulator Removal/Installation 25
Actuator Transformer Removal/Installation 26

Section 4
Circuit Description 27
Tuner/Demodulator 28
Video Circuitry 30
Audio Circuitry 33
CPU/Reset/Clock/Battery Back-Up Circuitry 39
Display Board/Relay Board 41
Power Supply 41

Appendix A
Adjustments 46

Appendix B
Pin-Outs 46

Appendix C
Component Locations 54

Appendix D
Specifications 58

Appendix E
Parts List 61

rev. 0490/mg

Safety

There are certain procedures that should be followed before working on any electronic equipment. These are not only to keep the technician from being hurt, but also to protect the equipment being worked on and to protect the test equipment.

Observe all warnings on the receiver, in the operating instructions, and on the test equipment. Water and moisture should be kept away from the unit being repaired at all times. Severe electrical shock could result if liquid is accidentally spilled in the unit. Keep your work areas clean and well organized. This will help prevent accidents from occurring. Always use the right tool for the right job. To be safe, use only a non-metallic screw driver to make all adjustments in the unit. Do not use anything other than those tools specifically made for adjusting electronic equipment. This will help prevent damage to the equipment, the technician, or both.

DO NOT DEFEAT THE GROUNDING (EARTHING) FEATURE OF THE POWER CORD. The removal of the ground (earth) pin on the AC plug could result in the unit working improperly. Not only does this adversely affect the operation of the unit, but it will void the unit's warranty, and compromise the safety of the product.

Before beginning to troubleshoot on any electronic equipment, insure that it is plugged into an isolation transformer. This will make sure that the unit's chassis ground is isolated from earth ground. When taking voltage measurements, care must be taken so that terminals are not accidentally shorted. This could result in damage to the IC, the test equipment, or both.

Acid core solder should not be used when soldering within the receiver. The type of solder suggested for all soldering is 60/40 resin core. All soldering and de-soldering equipment must be handled with care to prevent self-inflicted burns. Always keep this equipment in proper working order, and follow the manufacturer's instructions. Keep the tool tips clear of flammable materials. Be aware of others in your work area and take care to avoid exposing others to your soldering tools.

ESD (electrostatic discharge) is a problem that has plagued many technicians and been the cause of many hours of needless troubleshooting. ESD can be easily explained as the spark that occurs after walking across the carpet and reaching out to touch a metal doorknob. This release of static electricity is commonly in the neighbourhood of 3500 V. Now imagine walking across the same carpet to reach your workbench and touching an ESD sensitive component. The spark may not even be visible, yet still cause the component to overload and become faulty. Not knowing this, a technician could install this component only to discover that it is bad and think that there must be something else in the unit which is causing these components to malfunction when in actuality, it was bad when installed. One way to prevent this is to have grounded anti-static matting covering both the workbench and the walkways surrounding the work area. This matting will dissipate the static electricity and route it to ground thus protecting ESD sensitive devices. Also, it is highly recommended that technicians wear an ESD wrist strap, which should be connected to a ground rail whenever working on ESD sensitive electronic equipment.

Within the Echostar receiver is a switching power supply capable of producing potentials of up to 600 VDC. This voltage exists at several exposed points in the supply, including the power FET transistor heatsink. Due to this, the power supply is considered to be a subassembly and should be changed as a unit. Repairs on these power supplies have proven to be unacceptable due to the fact that during a failure, components located within the supply not involved with the failure have been weakened but not failed. Once the failed components have been replaced, the weakened components then start to fail, creating a repetitive failure. To prevent this from happening, the power supply needs to be changed, not repaired.

As can be seen in the table below, current should not be taken lightly, so extreme care must be used in the replacement of the power supply, and in the troubleshooting and repair of the motor drive circuitry. When the motor drive circuitry is energized, potentials up to 44 V and currents up to 2 A can be delivered to the terminal strip located at the back of the unit.

Echostar or any of its affiliates cannot be held responsible for damage, injury or fatalities occurring to persons or equipment while these products are being serviced.

Effects of a One-Second 60 Hz Electrical Shock

Current	Effect On The Skin
1 mA	tingle, at the edge of sensation
5 mA	maximum value of harmless current
1-10 mA	mild to moderate pain
10-20 mA	can cause muscular contractions preventing release from the source of the shock
30 mA	breathing may stop
75-300 mA	ventricular fibrillation
5 A	skin and tissue burns

SECTION 2

System Description

This section provides block diagrams and a functional description of each block of the receiver. It does not go in depth on any circuits, but provides an overview of system operation.

Overall Description

As shown in Figure 1, the intermediate frequency enters the tuner, which is the first I.F. stage. The 950-1750 MHz signal is mixed with a frequency from the voltage tuned oscillator (VTO), which is also located inside the tuner. The VTO is controlled by the phase-locked loop (PLL) that selects a specific tuning voltage. This causes the VTO to oscillate at a specific frequency which mixes with the I.F. to select the requested output frequency or signal. The signal then enters the demodulator (which strips the F.M. carrier) and enters the first amplifier (composite amplifier). After the signal exits the composite amplifier, it is split with one signal being routed to the video circuit and another routed to the audio circuit.

The video circuit processes the video signal and provides a MAC output, Video I output, Video II output, and a signal to the RF modulator. In the modulator it is mixed with the audio and is modulated from channel 31 to channel 39 as PAL B/G or PAL I, as selected by an external switch and potentiometer.

The audio, which is split from the output of the composite amplifier, is routed through an audio filter before entering a mixer. This circuit provides external audio outputs as well as a signal to the modulator. In the modulator it is mixed with the video and is modulated from channel 31 to channel 39 as PAL B/G or PAL I, as selected by an external switch and potentiometer.

The CPU circuit provides and receives control information to all the circuits in the receiver. It also processes information from the infrared remote control unit. Other blocks in the receiver include the power supply, motor control and polarity control.

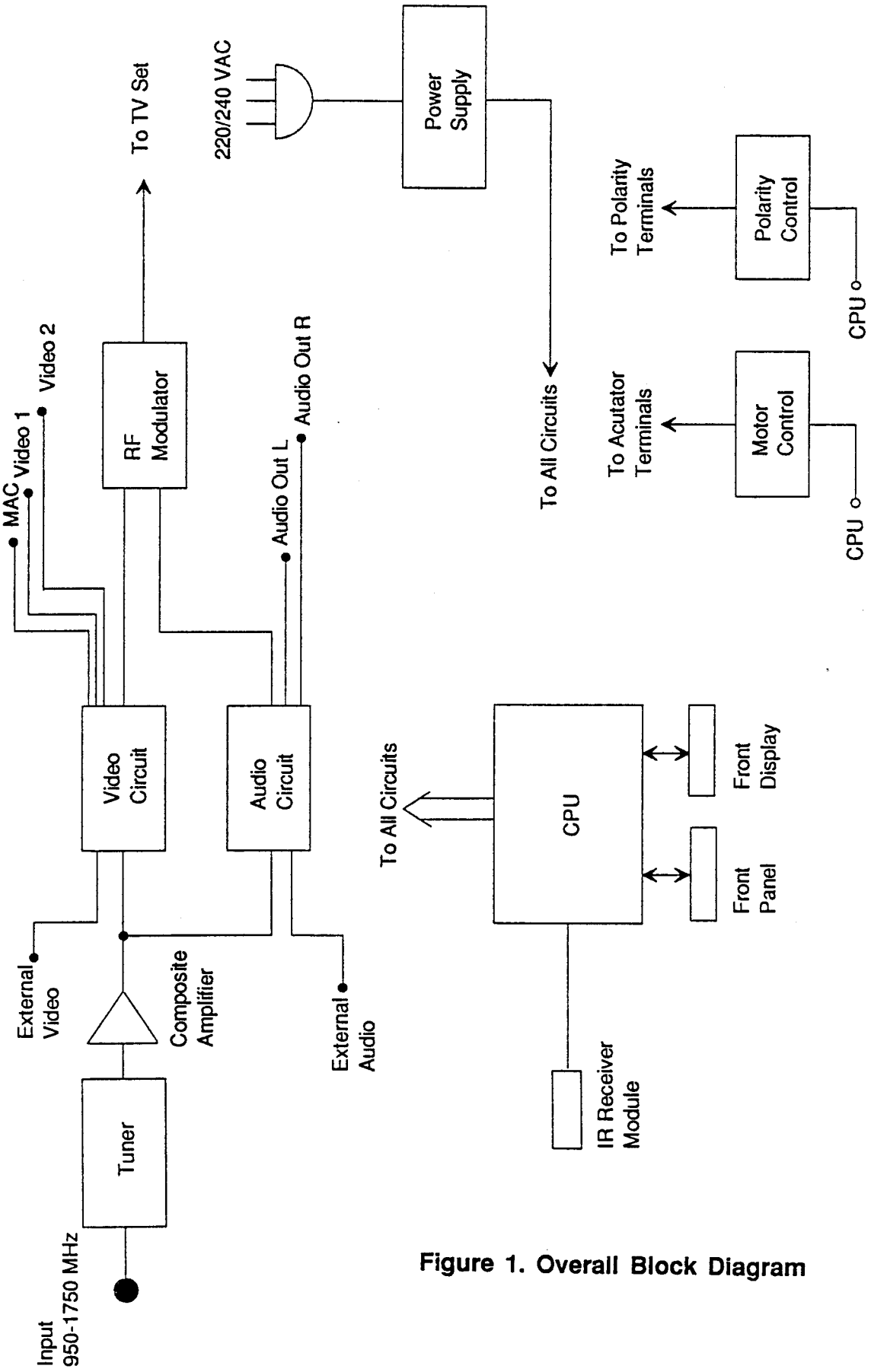


Figure 1. Overall Block Diagram

Video

As shown in Figure 2, the signal from the tuner is amplified, routed through a variable resistor, then split and applied to the Y inputs of U1 which select between inverted and non-inverted video. The Y output is then routed to the MAC output port as well as two deemphasis networks -- a 525 us for NTSC signals and a 625 us for PAL signals. The X output of U1 selects between the outputs of either the 525 or 625 us deemphasis networks and sends a signal to the baseband output. This signal is tapped and routed to another multiplexer (U2).

U2 selects between C-sync, the signal from U1 and external video. It takes a binary number input on A and B from the CPU and selects the corresponding input for output on X. The video is amplified, filtered further, and clamped to a DC level. The output of the clamping circuit is applied to U4 where graphics are mixed in. The Z output of U1 selects between Csync and +5V to send a signal to U4. The clamped video is then buffered and routed to the RF modulator and RCA outputs.

After the video is stripped from the sync pulses, the pulses are applied to a sync separator and a sync detector circuit. A sync detect level is then sent to the CPU for the purpose of determining proper sync selection.

As shown in the figure, the Video I output is the same signal that goes to the RF modulator. A switch on the modulator board selects between the Video I output and unclamped video for output at the Video II port.

Audio

Referring to Figure 3, the raw video signal is applied through a filter network where all frequencies outside of the 5.0 to 8.65 MHz range are attenuated. The audio is then split into two channels for Left and Right, amplified and routed to a mixer where the exact audio frequency is selected from the Colpitts oscillator and audio PLL.

After this, the narrow/130 kHz/280 kHz/400 kHz band selection is made and the audio is demodulated. This signal is then processed to obtain a 50 us deemphasized signal, a 75 us deemphasized signal, and J17 audio before being applied to multiplexer U7. After selecting between these three signals and external audio, the signal is applied to the volume control circuitry. It is amplified, and output to either the RCA jacks on the back of the receiver, or combined and buffered for output to the modulator.

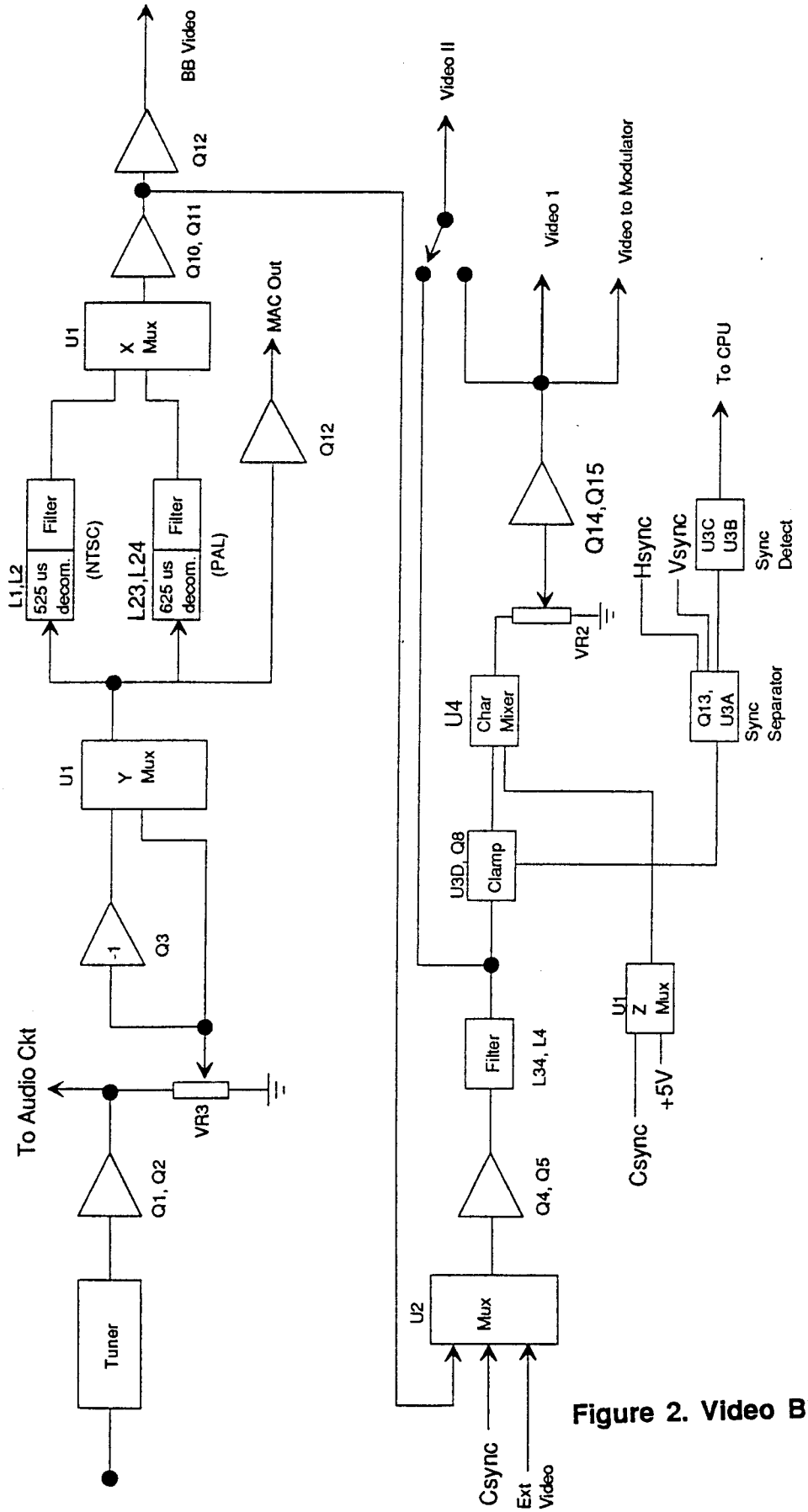


Figure 2. Video Block Diagram

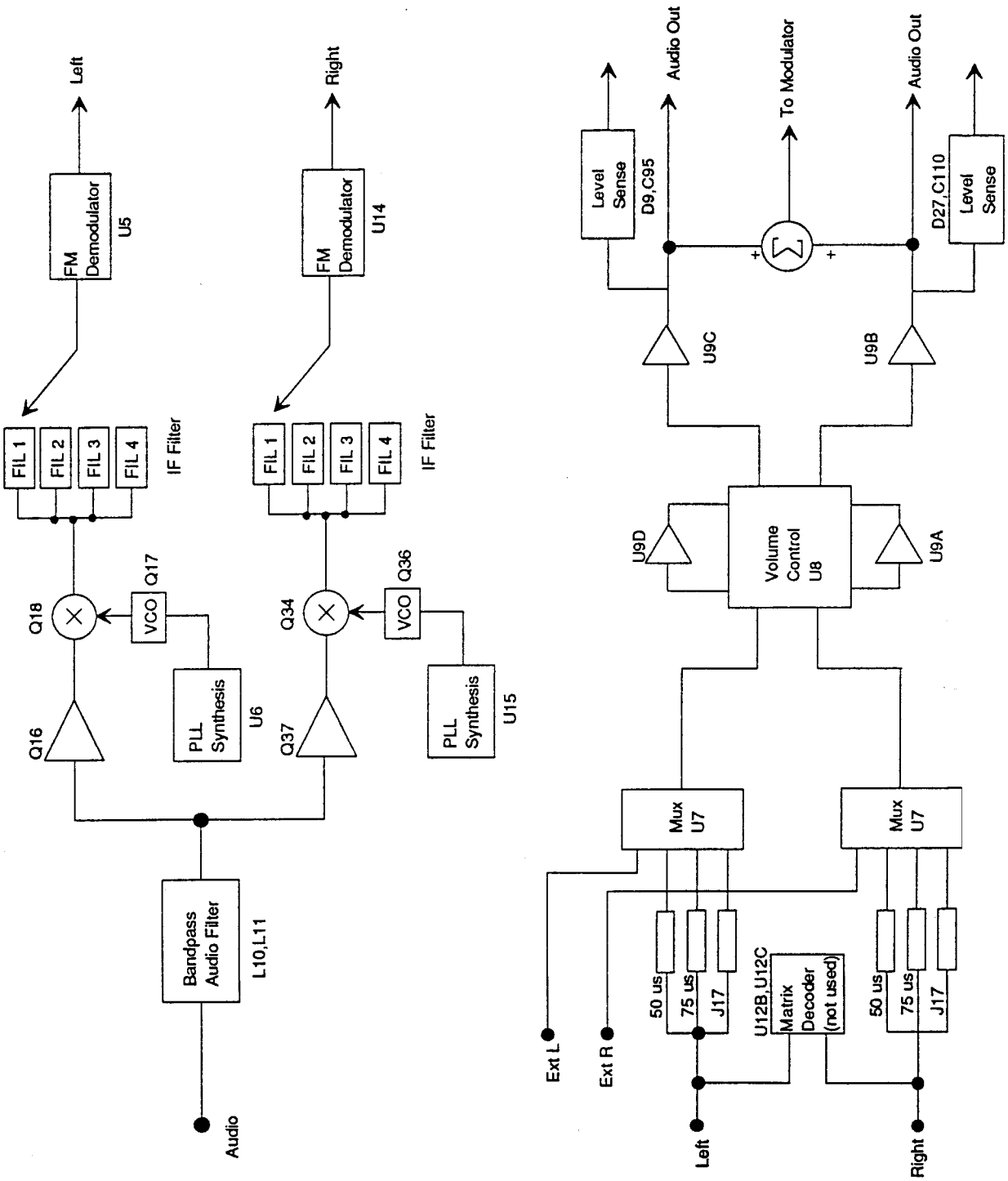


Figure 3. Audio Block Diagram

SECTION 3

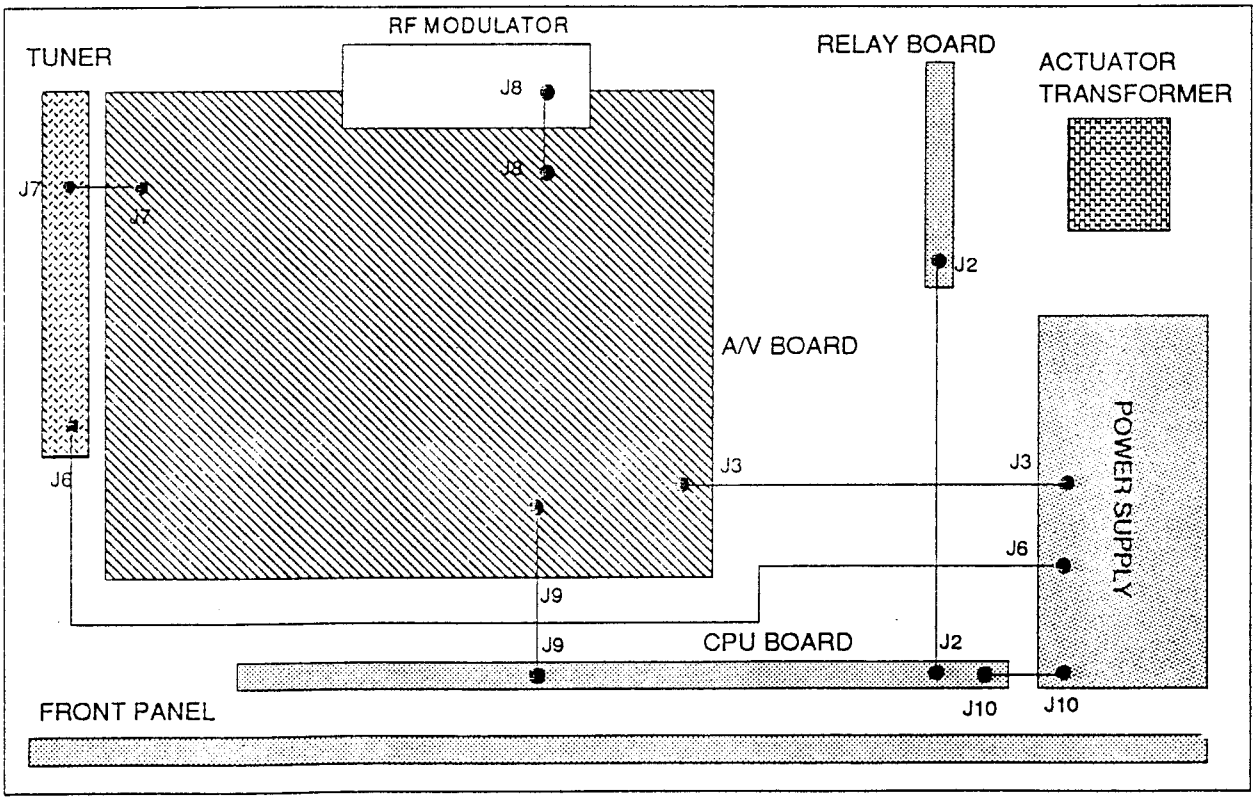
Troubleshooting/Board Removal & Installation Instructions

This section is to be used for board level repairs only. It begins with a troubleshooting flowchart that can be used to locate and identify a malfunctioning subassembly. This chart does not attempt to address all possible malfunctions, just those that we have seen to be the most common.

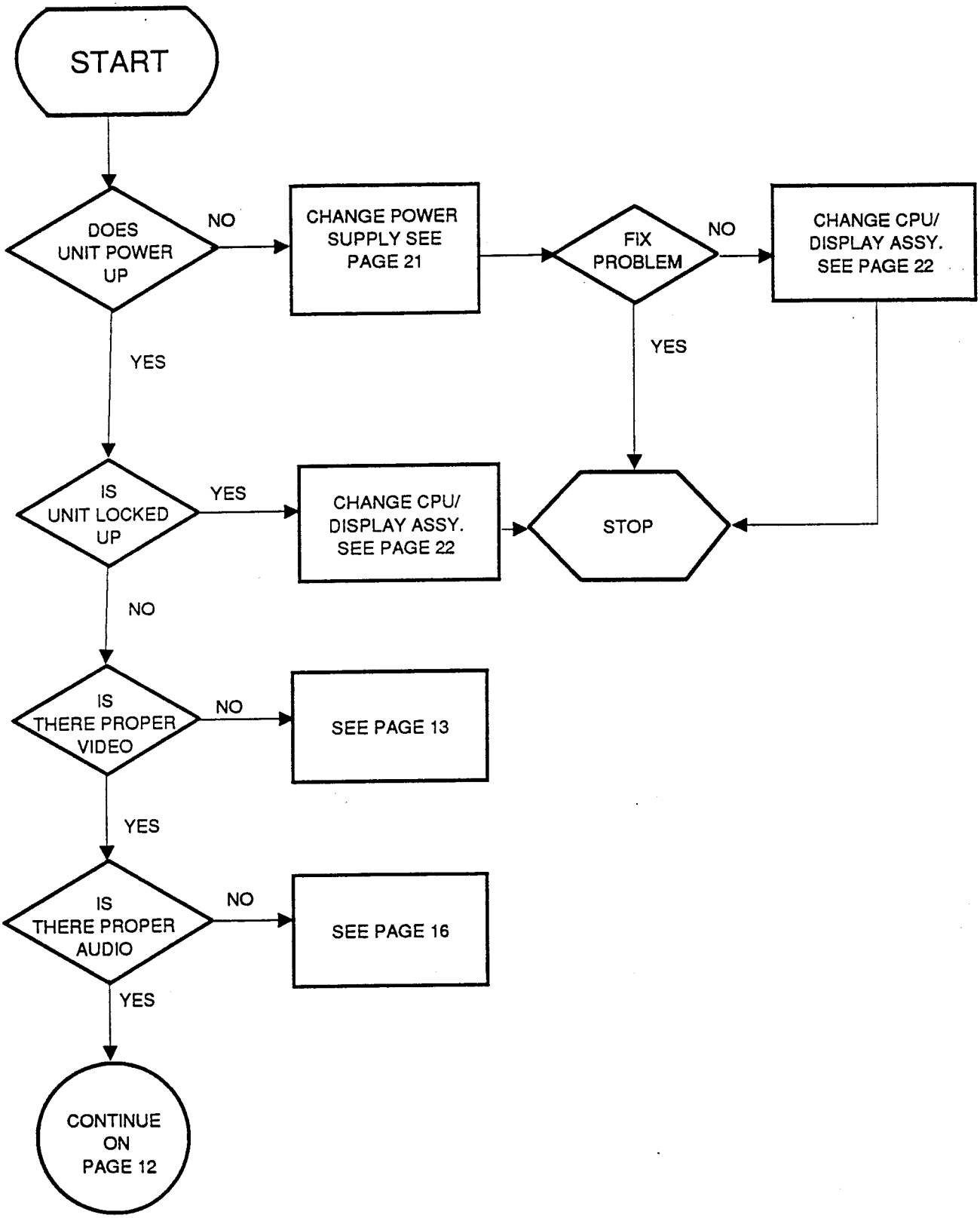
In order to use this flowchart, begin on the following page and look through the diamonds located on the left until you find the malfunction that comes closest to describing the problem you have encountered. Once you have located your malfunction, follow the arrow to the right and either go to the page that the block refers to or replace the board suggested. The figure below shows the board placement in the receiver.

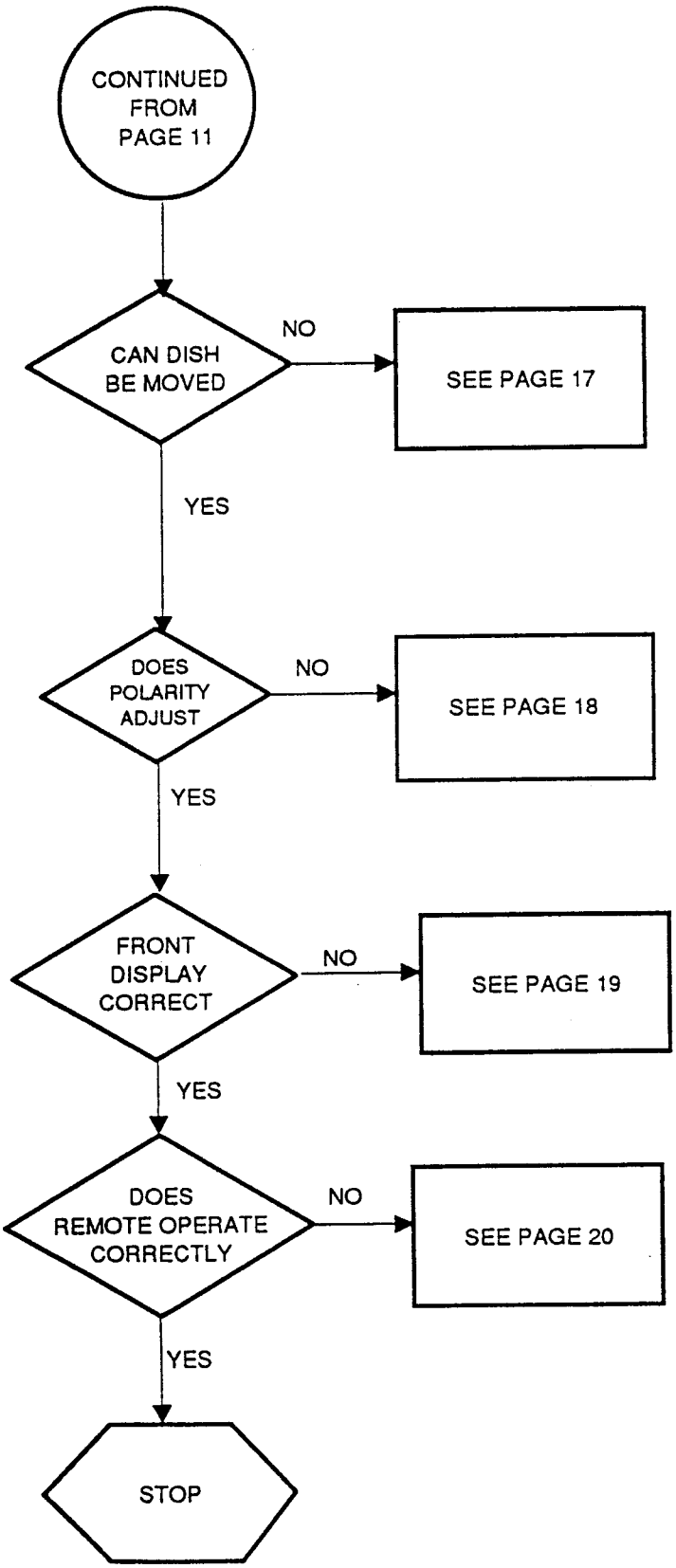
Following the flowchart, you will find instructions for the removal and installation of the subassemblies located within the receiver.

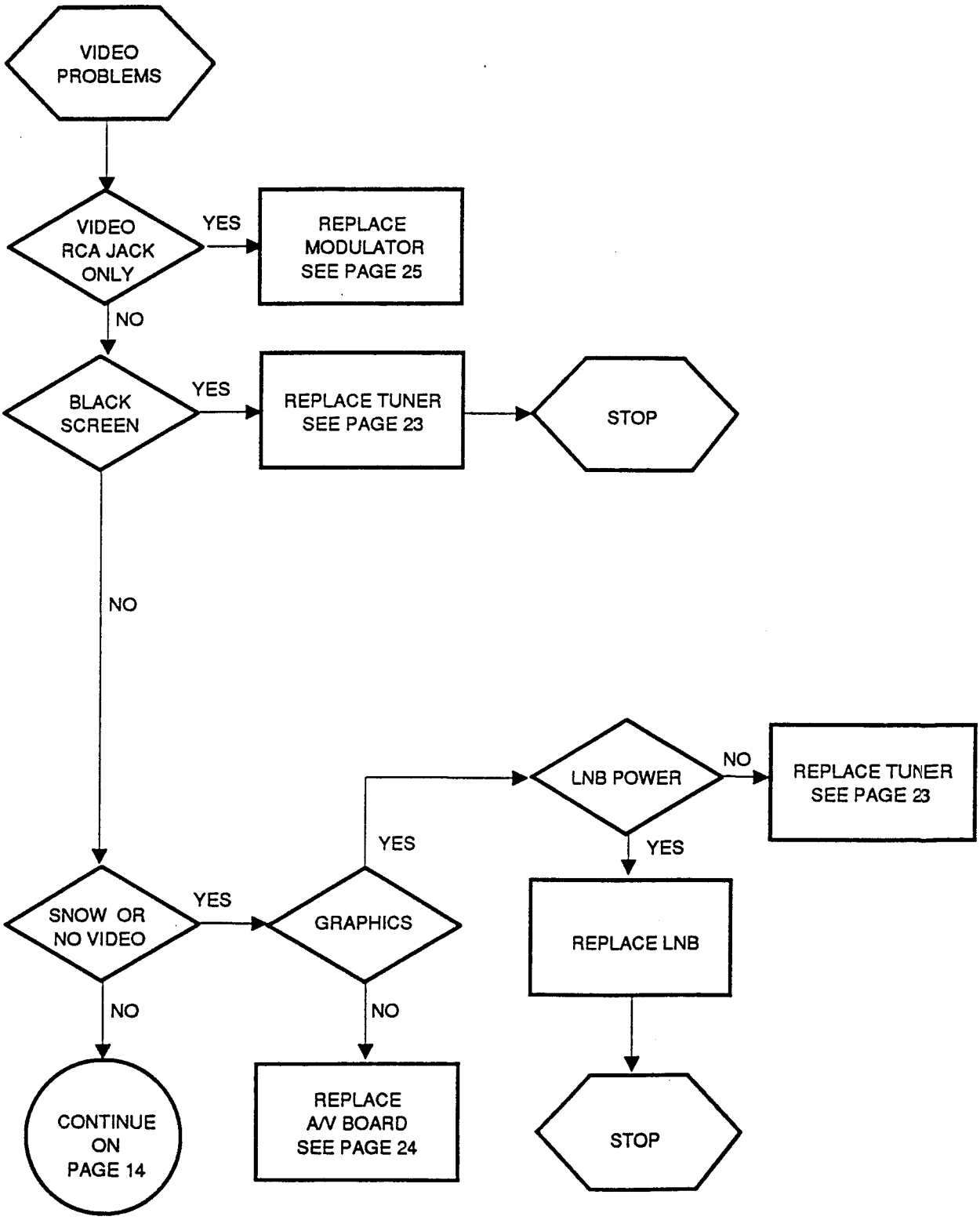
INTERNAL VIEW OF THE SR-5500

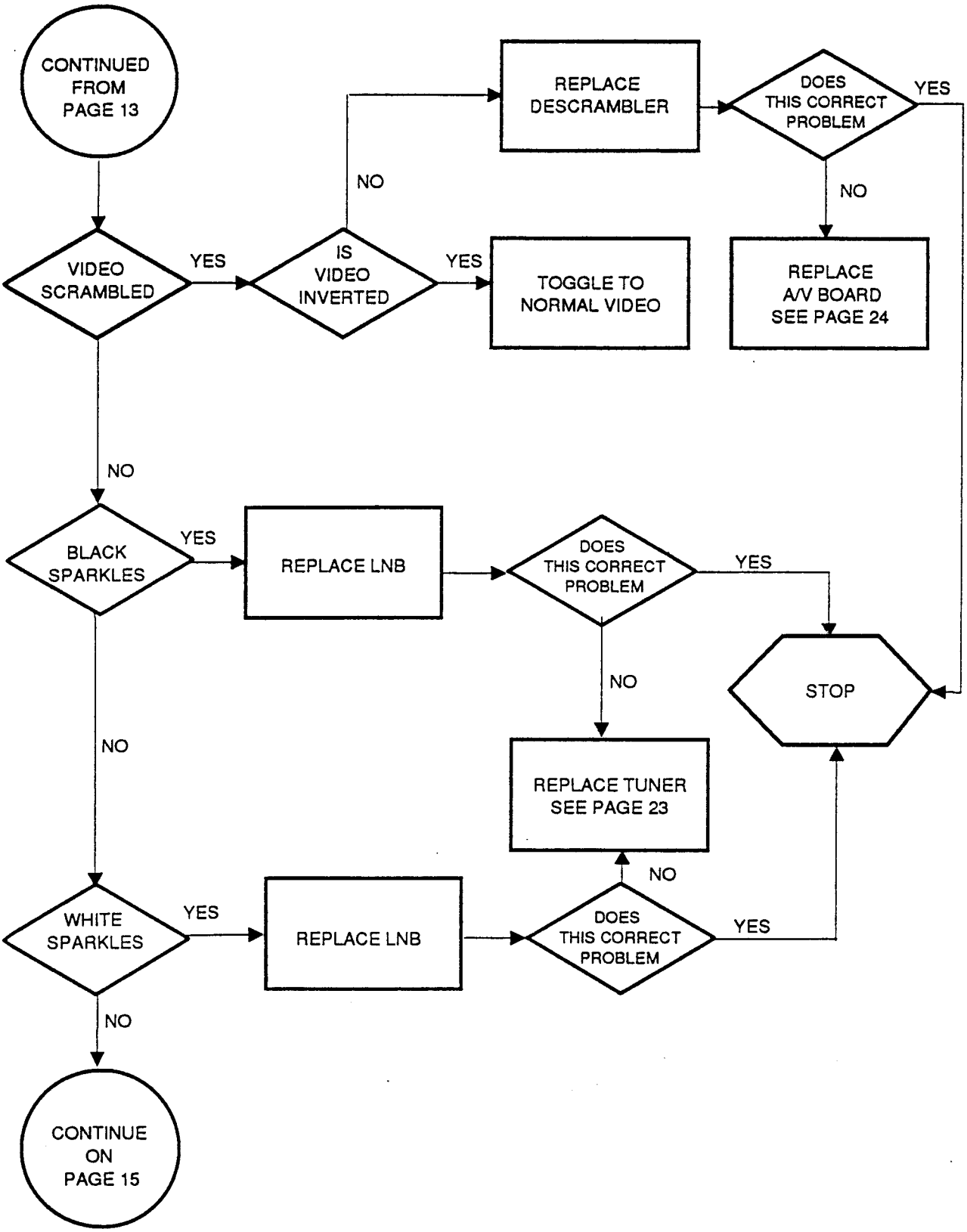


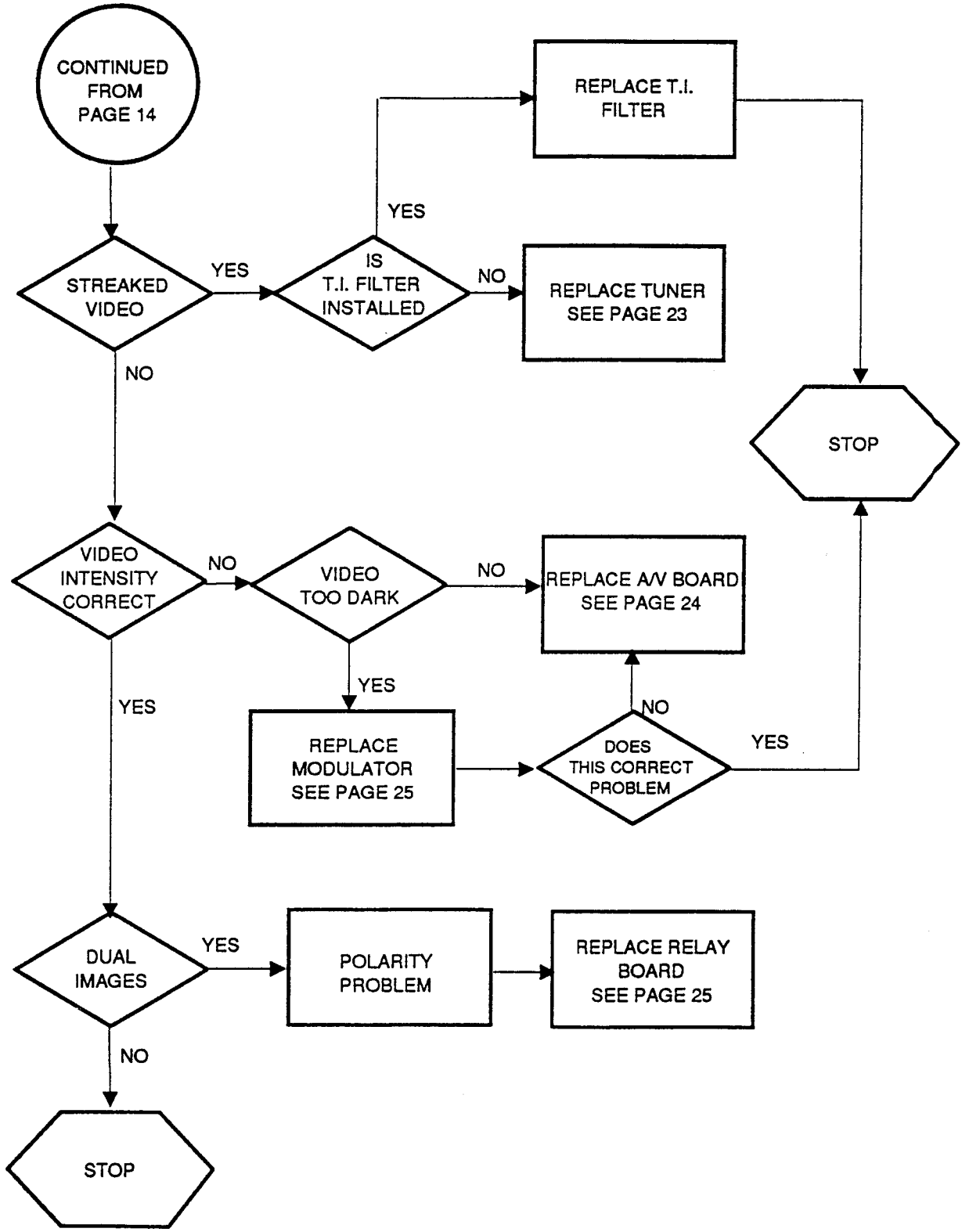
FRONT OF UNIT

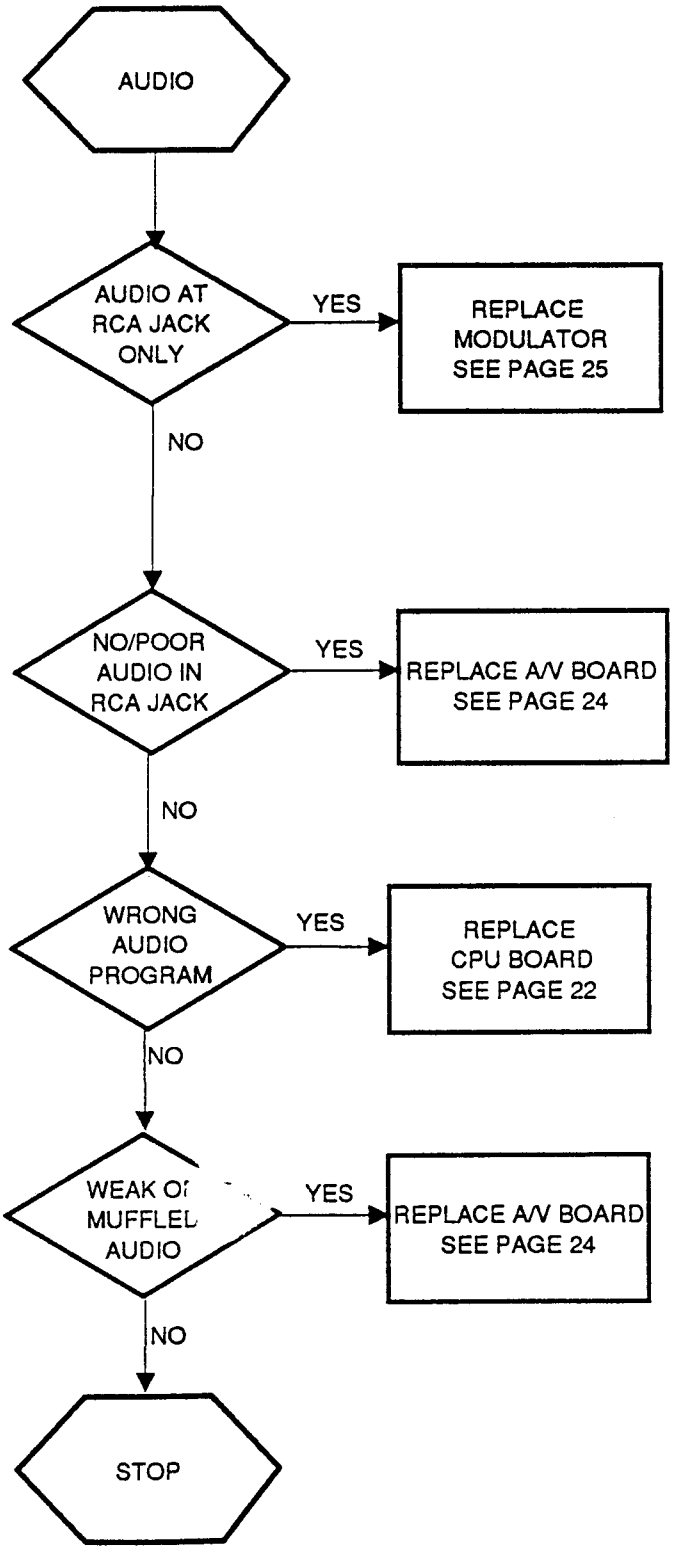

START
DOES UNIT POWER UP
NO
CHANGE POWER SUPPLY SEE PAGE 21
FIX PROBLEM
NO
CHANGE CPU/ DISPLAY ASSY. SEE PAGE 22
YES
YES
IS UNIT LOCKED UP
YES
CHANGE CPU/ DISPLAY ASSY. SEE PAGE 22
STOP
NO
IS THERE PROPER VIDEO
NO
SEE PAGE 13
YES
IS THERE PROPER AUDIO
NO
SEE PAGE 16
YES
CONTINUE ON PAGE 12

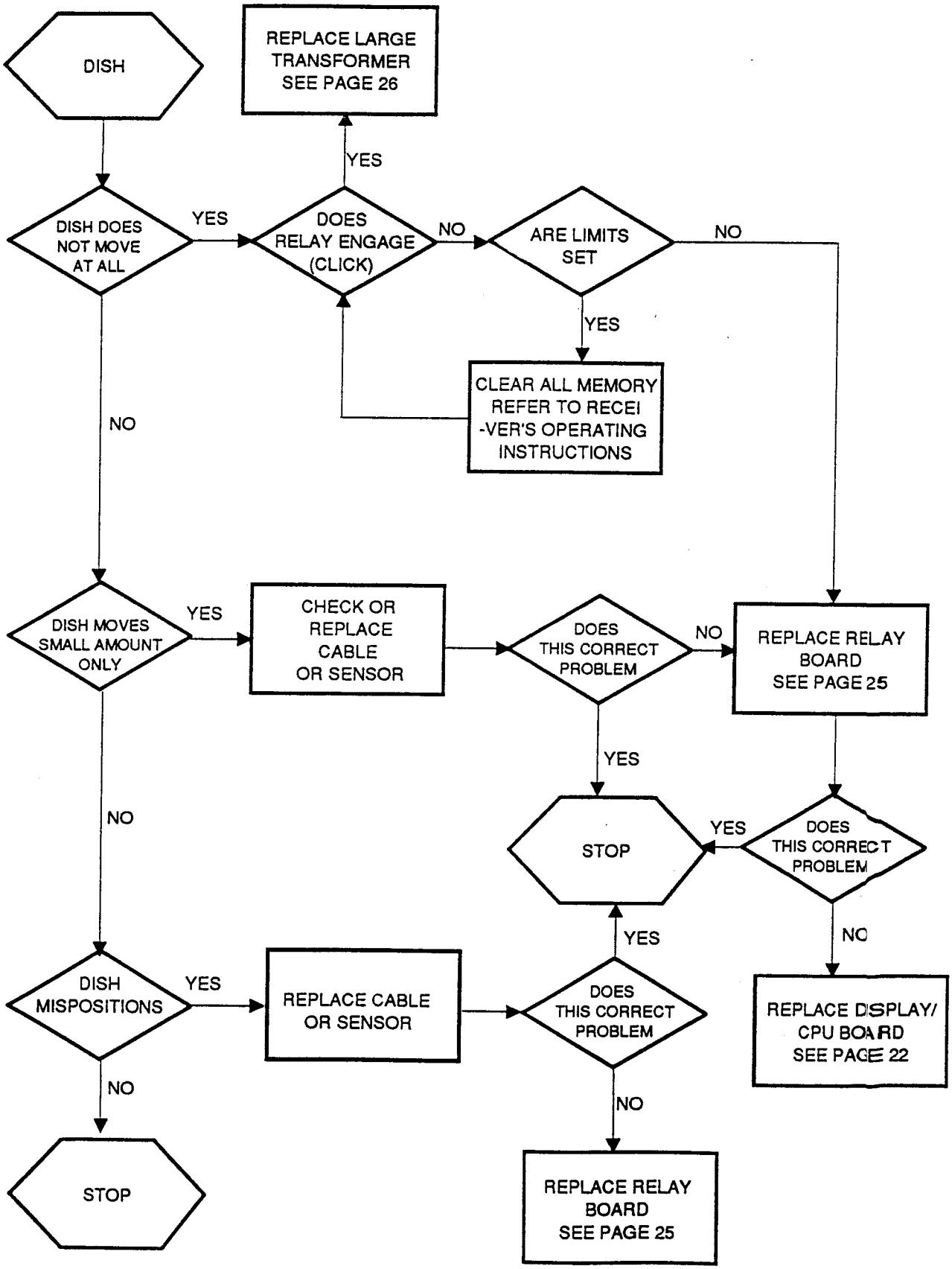

CONTINUED FROM PAGE 11
CAN DISH BE MOVED
NO
SEE PAGE 17
YES
DOES POLARITY ADJUST
NO
SEE PAGE 18
YES
FRONT DISPLAY CORRECT
NO
SEE PAGE 19
YES
DOES REMOTE OPERATE CORRECTLY
NO
SEE PAGE 20
YES
STOP

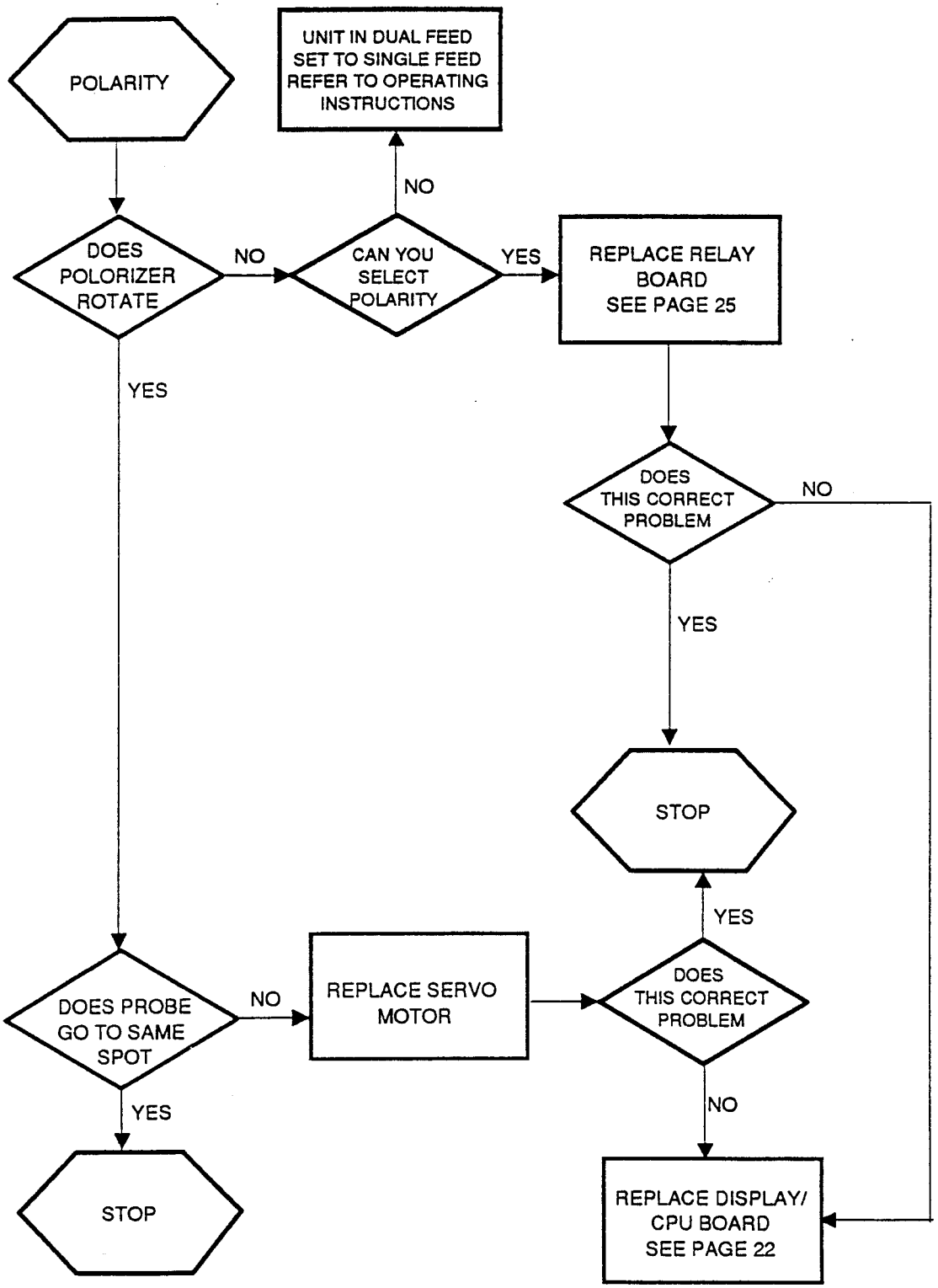

VIDEO PROBLEMS
VIDEO RCA JACK ONLY
YES
REPLACE MODULATOR SEE PAGE 25
NO
BLACK SCREEN
YES
REPLACE TUNER SEE PAGE 23
STOP
NO
LNB POWER
NO
REPLACE TUNER SEE PAGE 23
YES
YES
SNOW OR NO VIDEO
YES
GRAPHICS
REPLACE LNB
NO
NO
CONTINUE ON PAGE 14
REPLACE A/V BOARD SEE PAGE 24
STOP

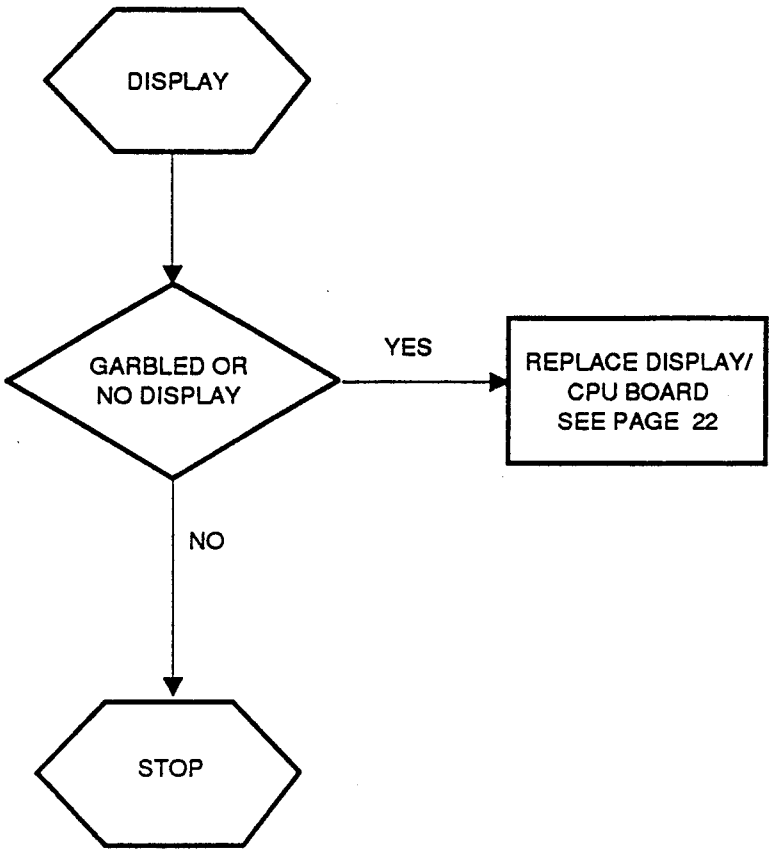

CONTINUED FROM PAGE 13
VIDEO SCRAMBLED
YES
IS VIDEO INVERTED
NO
YES
REPLACE DESCRAMBLER
DOES THIS CORRECT PROBLEM
YES
NO
TOGGLE TO NORMAL VIDEO
REPLACE A/V BOARD SEE PAGE 24
NO
BLACK SPARKLES
YES
REPLACE LNB
DOES THIS CORRECT PROBLEM
YES
NO
STOP
REPLACE TUNER SEE PAGE 23
NO
WHITE SPARKLES
YES
REPLACE LNB
DOES THIS CORRECT PROBLEM
YES
NO
CONTINUE ON PAGE 15

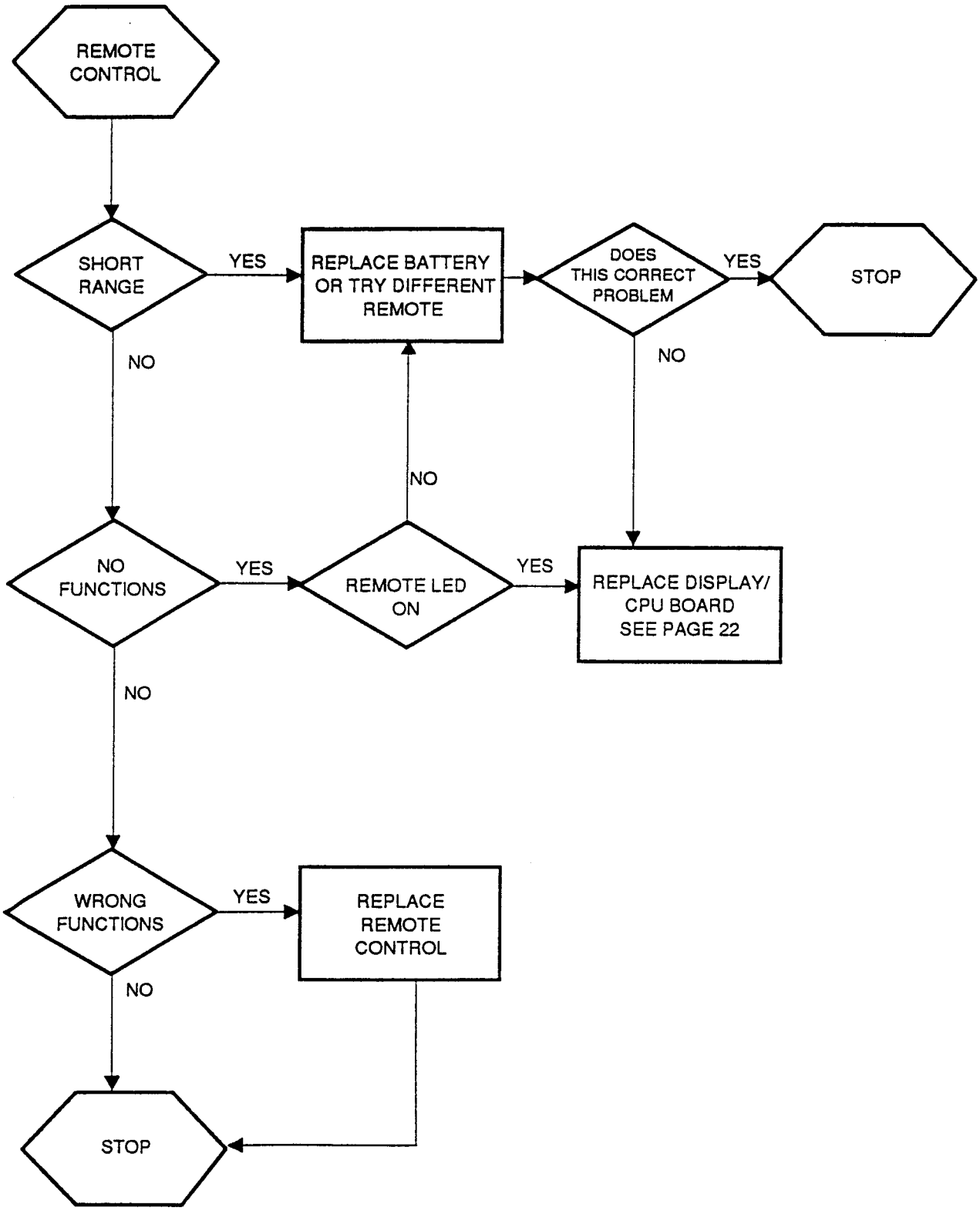

CONTINUED FROM PAGE 14
REPLACE T.I. FILTER
YES
STREAKED VIDEO
YES
IS T.I. FILTER INSTALLED
NO
REPLACE TUNER SEE PAGE 23
NO
STOP
VIDEO INTENSITY CORRECT
NO
VIDEO TOO DARK
NO
REPLACE A/V BOARD SEE PAGE 24
YES
YES
NO
REPLACE MODULATOR SEE PAGE 25
DOES THIS CORRECT PROBLEM
YES
DUAL IMAGES
YES
POLARITY PROBLEM
REPLACE RELAY BOARD SEE PAGE 25
NO
STOP


AUDIO
AUDIO AT RCA JACK ONLY
YES
REPLACE MODULATOR SEE PAGE 25
NO
NO/POOR AUDIO IN RCA JACK
YES
REPLACE A/V BOARD SEE PAGE 24
NO
WRONG AUDIO PROGRAM
YES
REPLACE CPU BOARD SEE PAGE 22
NO
WEAK OR MUFFLED AUDIO
YES
REPLACE A/V BOARD SEE PAGE 24
NO
STOP


DISH
REPLACE LARGE TRANSFORMER SEE PAGE 26
YES
DISH DOES NOT MOVE AT ALL
YES
DOES RELAY ENGAGE (CLICK)
NO
ARE LIMITS SET
NO
YES
CLEAR ALL MEMORY REFER TO RECEI -VER'S OPERATING INSTRUCTIONS
NO
DISH MOVES SMALL AMOUNT ONLY
YES
CHECK OR REPLACE CABLE OR SENSOR
DOES THIS CORRECT PROBLEM
NO
REPLACE RELAY BOARD SEE PAGE 25
YES
NO
STOP
YES
DOES THIS CORRECT PROBLEM
NO
DISH MISPOSITIONS
YES
REPLACE CABLE OR SENSOR
DOES THIS CORRECT PROBLEM
YES
REPLACE DISPLAY/ CPU BOARD SEE PAGE 22
NO
STOP
NO
REPLACE RELAY BOARD SEE PAGE 25


POLARITY
UNIT IN DUAL FEED SET TO SINGLE FEED REFER TO OPERATING INSTRUCTIONS
NO
DOES POLORIZER ROTATE
NO
CAN YOU SELECT POLARITY
YES
REPLACE RELAY BOARD SEE PAGE 25
YES
DOES THIS CORRECT PROBLEM
NO
YES
STOP
YES
DOES PROBE GO TO SAME SPOT
NO
REPLACE SERVO MOTOR
DOES THIS CORRECT PROBLEM
YES
NO
STOP
REPLACE DISPLAY/ CPU BOARD SEE PAGE 22


DISPLAY
GARBLED OR
NO DISPLAY
YES
REPLACE DISPLAY/
CPU BOARD
SEE PAGE 22
NO
STOP


REMOTE CONTROL
SHORT RANGE
YES
REPLACE BATTERY OR TRY DIFFERENT REMOTE
DOES THIS CORRECT PROBLEM
YES
STOP
NO
NO
NO FUNCTIONS
YES
REMOTE LED ON
YES
REPLACE DISPLAY/ CPU BOARD SEE PAGE 22
NO
WRONG FUNCTIONS
YES
REPLACE REMOTE CONTROL
NO
STOP

Power Supply Removal/Installation

----DANGER----

----UNIT MUST BE REMOVED FROM ALL POWER SOURCES BEFORE PROCEEDING----

1. Remove the power cord from the AC outlet and remove all wires from the back of the unit. These may include but are not limited to the polarity servo, motor drive, audio/video, LNB, TV set, and the TV antenna.

2. Remove the four Phillips head screws holding on the top cover. (Two on each side)

3. Remove the power supply cover. (This is found in the front right hand corner of the unit.)

4. Carefully remove all the connectors from the power supply.

5. Remove the screws securing the power supply to the chassis. Be sure to retain the star washers which must be used for reinstallation.

6. Carefully remove the power supply.

7. Installation is the reverse of removal.

8. Be certain to snap the cover into the correct position and solder the ground taps to the cover.

**Front Panel (Bezel Assembly)
and CPU/Display Removal/Installation**

1. Remove the power cord from the AC outlet and remove all wires from the back of the unit. These may include but are not limited to the polarity servo, motor drive, audio/video, LNB, TV set, and the TV antenna.

2. Remove the four Phillips head screws holding on the top cover. (Two on each side.)

3. Remove connectors J1, J2, J9, and J10 from the CPU board.

4. Position the unit so that the front three inches of the unit are overlapping the edge of your workbench. Locate and remove the four Phillips head screws located on the bottom of the bezel.

5. Remove the 2 gold coloured screws located on the right side 1.5 inches from the front of the unit.

6. Repeat step number five for the left side.

7. Remove the bezel assembly complete with CPU/display assembly still attached.

8. Remove the four silver coloured screws attaching the CPU board to the bezel assembly. NOTE: There is one in each corner.

9. Fold the CPU board over, being careful not to cause any kinks or sharp bends in the CPU/DISPLAY interconnect cable (J9).

10. Remove the silver screws connecting the display board to the bezel assembly.

11. Remove the CPU/display assembly from the bezel assembly.

12. Installation is the reverse of removal.

13. **NOTE: When re-connecting J2 and J9, special care must be taken to ensure proper connection. These plugs are double layer and Pin 1 is white. Misconnection can cause damage to the equipment.**

Tuner Removal/Installation

1. Remove the power cord from the AC outlet and remove all wires from the back of the unit. These may include but are not limited to the polarity servo, motor drive, audio/video, LNB, TV set, and the TV antenna.

2. Remove the four Phillips head screws holding on the top cover. (Two on each side.)

3. Follow steps 3-7 under the Front Panel (Bezel Assembly) removal procedures. (See page 24)

4. Unplug connector J7 from the main board (A/V board).

5. Remove the power supply cover, cut and remove the tie-wraps from the power supply cable harness, and unplug the power cable (J6), from the power supply. J6 is the third connector from the right.

6. Straighten the twist tabs holding the tuner on the left side of the chassis. On units with Astech tuners, remove the small Phillips head screw at the bottom on the unit which holds the tuner to the chassis.

7. Remove the 1/2 inch nuts and flat washers from the F-connectors on the rear panel. Save the nuts and washers for later use.

8. Slide the tuner toward the front of the chassis until the F connectors clear the back panel, then lift the tuner out of the receiver.

9. Installation is the reverse of removal.

A/V BOARD Removal/Installation

1. Remove the power cord from the AC outlet and remove all wires from the back of the unit. These may include but are not limited to the polarity servo, motor drive, audio/video, LNB, TV set, and the TV antenna.

2. Remove the four Phillips head screws holding on the top cover. (Two on each side.)

3. Remove the connectors between the A/V Board and all other subassemblies. Note the pin positioning of each connector prior to unplugging the A/V board.

4. Remove the six screws holding the board to the chassis.

5. Slightly raise the front of the board and gently pull towards the front of the unit.

6. Replacement is the reverse of removal.

7. **NOTE: Special care must be taken when installing all double layer plugs to ensure proper connection. Misconnection can cause damage to the unit.**

Relay Board Removal/Installation

1. Remove the power cord from the AC outlet and remove all wires from the back of the unit. These may include but are not limited to the polarity servo, motor drive, audio/video, LNB, TV set, and the TV antenna.

2. Remove the four Phillips head screws holding on the top cover. (Two on each side.)

3. Remove the two screws attaching the Relay Board to the chassis.

4. Lift Relay Board out of unit.

5. Remove the 5 plugs on the Relay Board.

7. Remove the 2 connectors that come from the actuator transformer.

8. Installation is the reverse of removal.

RF (Channel 31-39) Modulator Removal/Installation

1. Remove the power cord from the AC outlet and remove all wires from the back of the unit. These may include but are not limited to the polarity servo, motor drive, audio/video, LNB, TV set, and the TV antenna.

2. Remove the four Phillips head screws holding on the top cover. (Two on each side.)

3. Remove Relay Board. (See page 27)

5. Remove connector J8 from the A/V board.

6. Remove the two screws holding the modulator to the chassis.

7. Gently pull the RF Modulator towards the front of the receiver and lift it out of the chassis.

8. Installation is the reverse of removal.

Actuator Transformer Removal/Installation

1. Remove the power cord from the AC outlet and remove all wires from the back of the unit. These may include but are not limited to the polarity servo, motor drive, audio/video, LNB, TV set, and the TV antenna.

2. Remove the four Phillips head screws holding on the top cover. (Two on each side.)

4. Remove the Relay board. (See Page 27).

5. Remove the Power Supply cover. (located at the front right corner of unit)

6. Remove the four screws connecting the actuator transformer to the chassis.

7. Lift the actuator transformer out of the chassis.

8. Installation is the reverse of removal.

SECTION 4

Circuit Description

This section contains in-depth circuit analysis. By reading this section, a qualified electronics technician should be able to reach an adequate understanding of how all portions of the unit operate.

First is the tuner/demodulator. This is primarily a functional description because the tuner is a sealed unit. Following the analysis, is a brief guide that will explain the most common tuner failures and key points to look for. This is followed by video and audio circuit analysis. The CPU board is next. Included in the CPU board description are brief explanations of the Z80 microprocessor, the reset circuit, the clock, battery, sync selection and graphics generation circuits. The display board and a diagram of the 14 segment displays located on the display board follow. The diagram shows which segment is controlled by which pin and where digit and segment drivers are.

As previously stated, the power supply should be changed as a subassembly and should not be repaired. Due to this, only an overview is given. However, a schematic of the power supply is included so that you can find the proper location for the power supply voltages and plug locations. Next are the motor drive, motor pulse and polarity circuits.

Tuner/Demodulator

The input frequency of the Echostar SR-5500 satellite receiver is 950-1750 MHz. The tuner is designed to work with this frequency from an LNB that uses high side injection for C-band or low side injection for FSS, DBS and Telecom bands. The tuner uses a tuning voltage supplied from the video PLL on J7 pin 2 (See Figure 4). A video PLL determines the proper tuning voltage based on the serial data, serial clock, video PLL data generated by the CPU, and by monitoring the tuner frequency on J7 pin 3.

The tuning voltage supplied on J7 pin 2 will cause the VTO located inside the tuner to oscillate at a frequency which will pick the proper carrier information at a second IF frequency of 479.5 MHz. After this, the carrier will be demodulated and passed to the A/V board as raw inverted video via J7 Pin 1. J6 carries the DC voltages for operation of the tuner-demodulator from the power supply circuit. Pin 4 carries 22 VDC and is passed on to power the LNB. Pin 3 carries 12 VDC, and pin 1 carries 5 VDC. These are used to power the internal circuits of the tuner/demodulator.

J7 pin 4 is the AGC output of the tuner/demodulator which is used to control the signal strength circuitry for display and auto peaking. H-V select on J7 pin 5 supplies the tuner/demodulator with information for formatting the two LNB inputs properly. The upper or horizontal port will be selected when J7 pin 5 is low. The lower, or vertical port is selected when J7 pin 5 is high.

The tuner/demodulator does not normally require service or maintenance. If this subassembly fails, it should be replaced as a unit. Do not attempt to fix it.

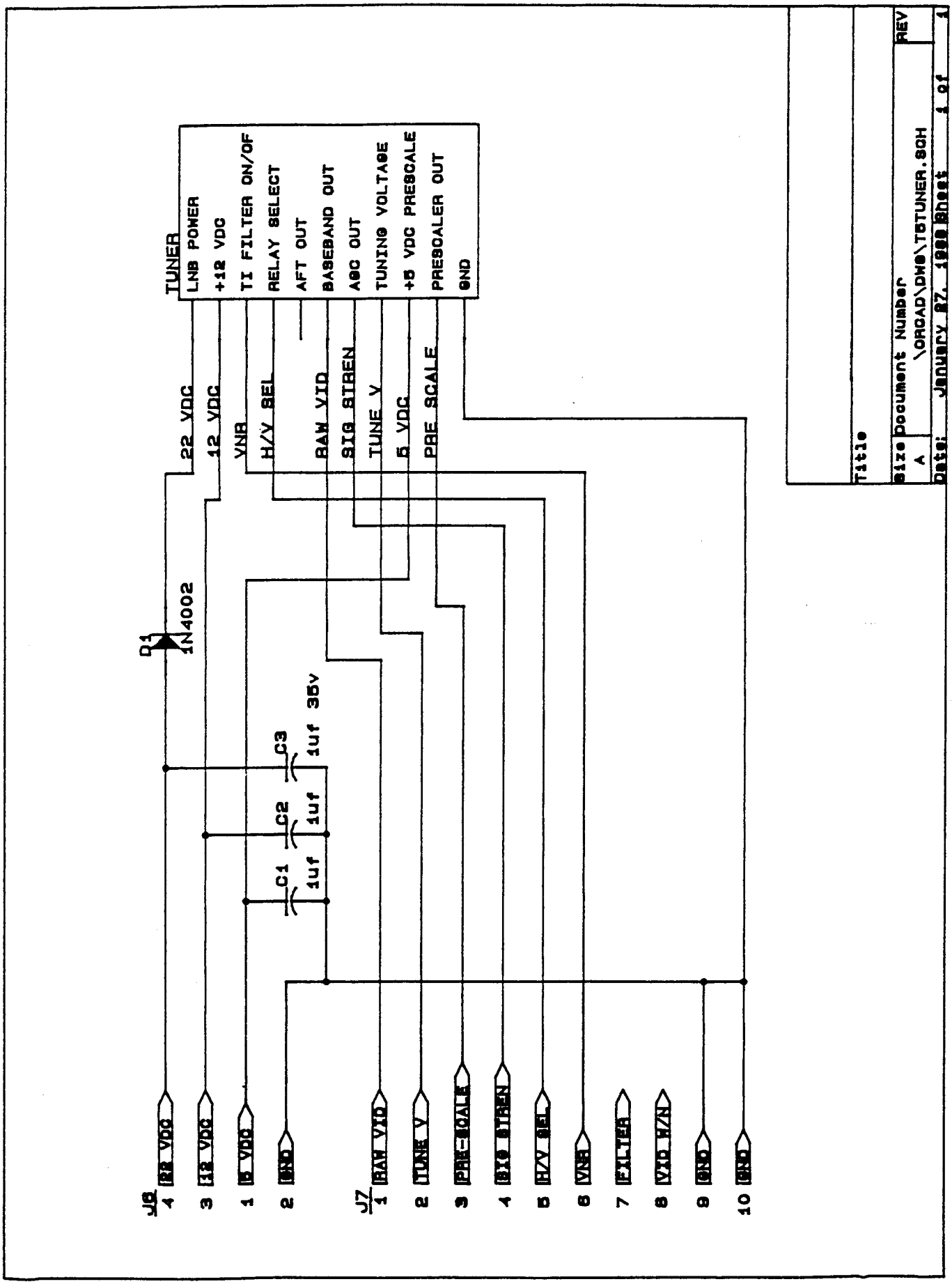


Figure 4. Tuner Interface Board

Video Circuitry

As shown in Figure 5, raw video from the tuner enters the video circuit on J7 pin 1 and is fed through the first stage baseband amplifier. This is a push-pull amplifier (Q1,Q2) and has a gain of two. The amplified signal then passes through coupling capacitor C19. At the tie point, the video signal is split into two paths. One path goes to the audio circuit to strip off all video and process the audio. The other goes into the baseband video adjustment VR3. From the wiper of VR3, the signal is split again, fed to pin 1 on U1, and routed through coupling capacitor C20 to the base of Q3. Q3 will invert the video and apply it to pin 2 on U1. Pins 1 and 2 are controlled by the video inverted control from the gate array (U1 Pin 10). When inverted video is selected in the unit, U1 pin 10 will be high, thus allowing the signal on U1 pin 1 to be routed to the Y output on pin 15. The selection of normal video will cause pin 10 to be low, allowing the video on pin 2 to be output on pin 15.

Once either normal or inverted video has been selected, the signal will pass through coupling capacitor C22 to the base of Q9. Transistor Q9 acts as a signal buffer to help clean transient noise from the video. At the tie point, the signal is sent to the MAC output. This signal is also sent to a 525 us deemphasis network (L1, L2, etc.) and a 625 us deemphasis network (L23, L24 etc.) before being filtered. The outputs of deemphasis/filter networks are fed back to pin 12 and pin 13 respectively on U1.

U1 pins 12 and 13 are controlled by U1 pin 11 which is the baseband filter control line (525/625 us SEL) from the gate array on J9 pin 29. The selected signal is output on pin 14 on U1. This is applied to Q10 and Q11. This output is sent to pin 14 on U2 and transistor Q12 which sends the signal to the baseband video output.

U2 is a 4052 digital switch that is used to select one of three signals. Pin 12 is the composite sync pulse, pin 14 is the filtered baseband video, and pin 11 is the external video input. Pins 9 and 10 are the control lines being generated from the gate array. The 4052 looks at these two control lines and determines the binary number being sent (pin 10 is the LSD and pin 9 is the MSD).

The video signal is next fed into an amplifier (Q4, Q5) which has a gain of three. From the collector on Q5, the signal is further filtered by a lowpass filter (L34, L4) and then applied to the horizontal sync separation circuit where the video is stripped from the signal. From the output of operational amplifier U3D, the sync pulse that is left is applied to the base of Q13 in the sync detect circuit and to the base of Q8 in the clamping circuit.

Q8 is a video buffer and with the aid of C8, R182 and R69 clamps, the sync pulse goes to a DC level. From the emitter of Q8, the sync pulses are once again mixed with the video which has been tapped off after the lowpass filtering and applied to U4 pin 5.

From the base of Q13, the sync pulses enter the sync detect circuitry and are inverted by Q13. R74 pulls the inverted pulses up to a 5 VDC level and sends it to the gate array as a 16.3 kHz horizontal blanking pulse on J9 pin 24. This pulse is also applied to the non-inverting input of U3 pin 5. On U3 pin 2 there is a pulse which starts at a 4.8 VDC level and pulses to ground at a frequency of 59 Hz. This is sent to the gate array as the vertical sync pulse on J9 pin 23. It is also sent through D2 to capacitor C3 which converts the sync pulse to a DC level. The signal passes through R44 where C4, C5 and R45 complete the conversion to DC. VR1 is used to adjust the DC level being applied to U3 pins 7 and 8.

A regulated +5 VDC is applied to the voltage divider network comprised of R46, R47 and R48. After passing through R48, approximately 3.5 VDC is applied to the non-inverting input of U3 pin 9. This will result in a high signal being output on U3 pin 14. After passing through R47, approximately 1.6 VDC is applied to the inverting input of U3 pin 6. This causes a high signal on U3 pin 1.

When there is no video present, the voltage on U3 pins 7 and 8 will rise to approximately 5 VDC. This will cause U3 pins 1 and 14 to go low and tell the gate array on J9 pin 22 that there is no video present in the receiver and that the composite sync pulse needs to be selected for use within the system. (The composite sync pulse is required by the graphics generator when no video is present.) When the sync detect line J9 pin 22 is high as described above, it tells the gate array that there is video present and that the horizontal and vertical sync pulses should be selected for use within the system.

U4 receives various voltage levels on pins 1, 2, 4 12, 13, 14, and 15. These voltages are supplied from 5 VDC being routed through a voltage divider network comprised of R51, R52 and R65. Mixed with this voltage is a high or a low signal coming from the gate array on J9 pin 3. This sync on control line is also applied to U1 pin 9 for use in the selection of proper sync. When a high signal is seen on U1 pin 9, a high signal is output on U1 pin 4. When U1 pin 9 is low, there is no video in the circuit and the composite sync signal will be selected from U1 pin 5 and output on U1 pin 4.

The composite sync from U1 pin 4 is used as one of the control lines to mix the graphics with the video. When video is present, U4 pin 9 is at a +5 VDC level. When there is no video, the positive-going composite sync pulses are seen. U4 pin 10 carries the "black on" signal being sent from the CPU board on J9 pin 4. These are also positive-going pulses. On U4 pin 11 the "white on" signal from the CPU can be seen as negative-going pulses. These three control lines are used to alternately select between the inputs so that the proper graphics can be mixed with the video. The complete video signal (with appropriate graphics) is routed out of U4 on pin 3 and buffered by emitter-follower Q14. The signal is then passed through VR2 which is used to adjust the output video to 1 volt peak-to-peak. From the emitter of buffer Q15, the video is sent to both the RF modulator on J8-4 and the RCA jack JK5 or Video I.

The unclamped video at the output of lowpass filter (L34, L4) is sent to the RF modulator interface board. A switch on this interface board (Figure 10) selects between this signal and the Video I signal and outputs it on the Video II port at the back on the unit.

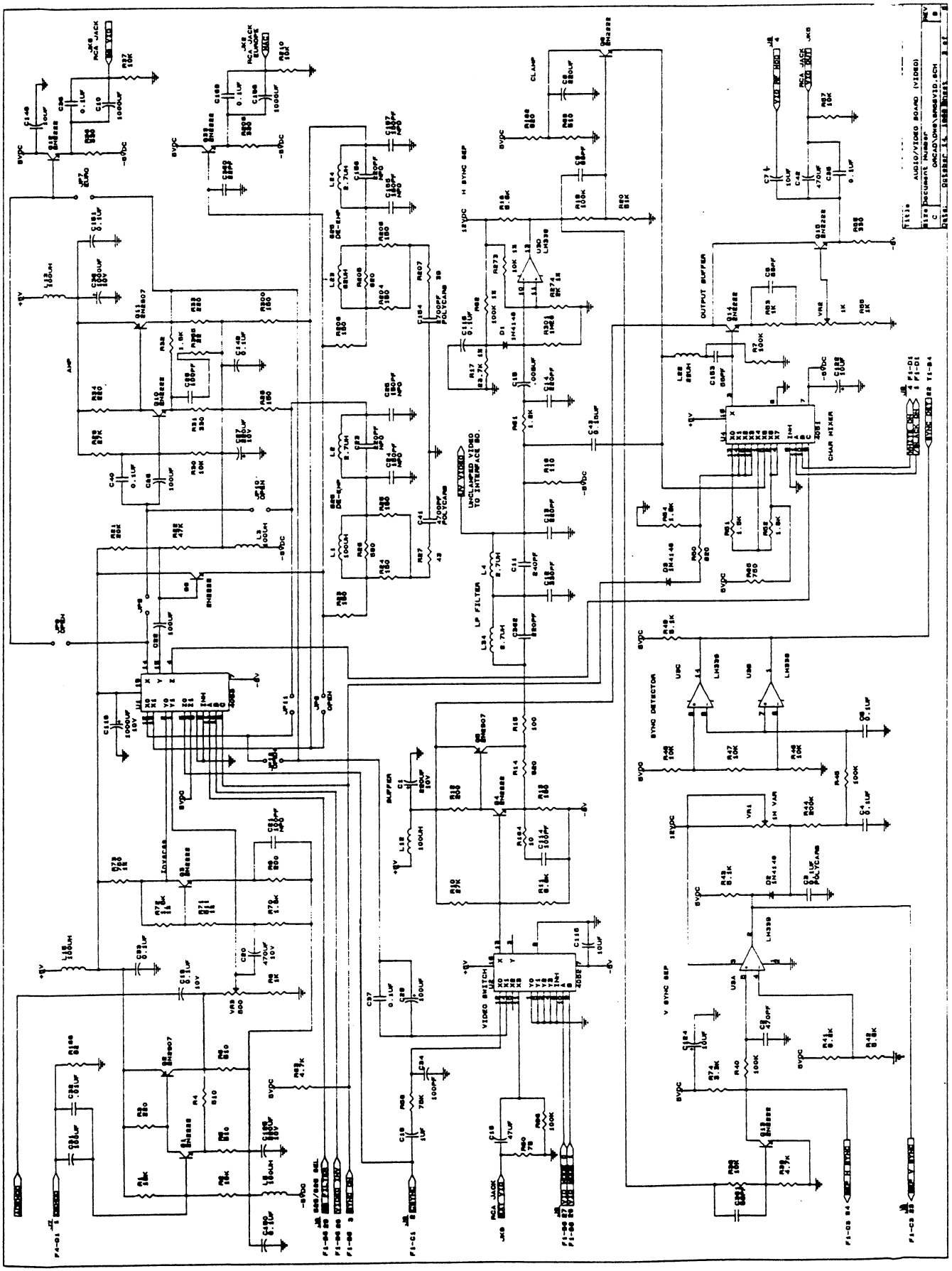


Figure 5. Video Circuit Diagram

Audio Circuitry

Before explaining the actual audio circuit, it is first necessary to examine what the audio signal is comprised of. The audio information is FM, with a center frequency of 10.7 MHz. After the audio information is frequency modulated, it is mixed with the local oscillator signal that is required to produce a frequency equal to that of the desired audio subcarrier. Since the frequency at the input to the mixer is 10.7 MHz, the required subcarrier frequency is 6.8 MHz, and high-side injection is being used (the oscillator is higher in frequency then the incoming signal), the desired local oscillator frequency is equal to the sum of these two frequencies.

6.8 MHz + 10.7 MHz = 17.5 MHz

This 6.8 MHz subcarrier is then combined with any additional subcarriers to be located on that transponder, along with the video to produce the composite signal. Any other audio subcarriers that may exist on the same transponder will go through this same process except they will have a different local oscillator frequency and thus a different subcarrier frequency. They can then be combined together with the video to produce the composite signal. Beginning at the Audio RF schematic (Figure 6), the signal from the demodulator feeds into a 5 MHz - 8.65 MHz bandpass filter made up of L9, L10, L11, C55, C65, and C66. At this point, the signal is split to accommodate the Left and Right audio circuits. Figure 7 shows the left channel.

After feeding through coupling capacitor C119, the signal is applied to the base of transistor Q16. The signal then passes through another coupling capacitor C54 before feeding into the G1 input of the dual gate MOSFET Q18 which acts as a mixer. Working in conjunction with Q18 are L16, R77 and C120. These additional components assist in filtering the 10.7 MHz audio signal. After the mixer, the signal passes through coupling capacitor C51. The voltage controlled oscillator (VCO) (comprised of Q17, D4, etc.) is used to tune the audio subcarriers. Q17 is a Colpitts oscillator that is tuned by the varactor diode D4. The frequency of this oscillator ranges from 15.7 to 19.2 MHz. If the audio is tuned to 5 MHz, the oscillator will run at 15.7 MHz. If the audio is tuned to 8.5 MHz, the oscillator will run at 19.2 MHz. The tuning voltage to the oscillator is fed from pin 6 of the PLL IC U6 (SAA1057) and ranges from approximately 3 to 9 VDC. Feedback to the phase lock loop is provided through R106 and C121 and enters U6 at pin 11. Absence of this feedback signal will result in shutdown of the PLL tuning circuit. Data to U6 is supplied from the CPU on J9 pins 13, 14, and 20.

I.C. 74HC139 (U13) has two inputs that are supplied by the gate array. The outputs of this integrated circuit select the appropriate band filter. When pin 12 is low, the 130 kHz filter is selected. When pin 11 is low, the 280 kHz filter is selected. When pin 10 is low, the 400 kHz filter is selected, and when pin 9 is low, the narrowband filter is selected. The output of the selected filter is applied through coupling capacitor C44 to pin 1 on U5. U5 (1140) is the FM detector that demodulates the audio signal. After exiting U5 on pin 8, the signal is routed to the input on Figure 8. From here, this signal is processed to obtain a 50 us deemphasized signal, a 75 us deemphasized signal, and a J17 signal. These three signals together with the external audio signal are fed into U7. U7 selects the appropriate audio for both left and right channels and feeds both audio signals to the volume control I.C. (U8) at pins 3 and 14.

The output of the volume control IC is sent to the non-inverting inputs of U9A and U9D and after passing through the op-amps, is re-applied to U8 on pins 12 and 5. Serial Data (pin 10), Clk (pin 9) and Vol Sel (pin 7) from the CPU give the necessary information to U8 to select the proper volume before the signal is routed to U9B/C. The left audio signal leaves U9C on pin 8 and is routed through coupling capacitor C83 to the left audio jack (JK3) on the rear of the unit and also through resistor R124 to the base of Q21. The right audio signal leaves U9B on pin 7 and is routed through coupling capacitor C84 to the right audio jack (JK4) located at the rear of the unit and through resistor R125 to the base of Q21. At Q21 the left and right audio are mixed, sent through buffer Q21 and on to the modulator through coupling capacitor C91 on J8 pin 2.

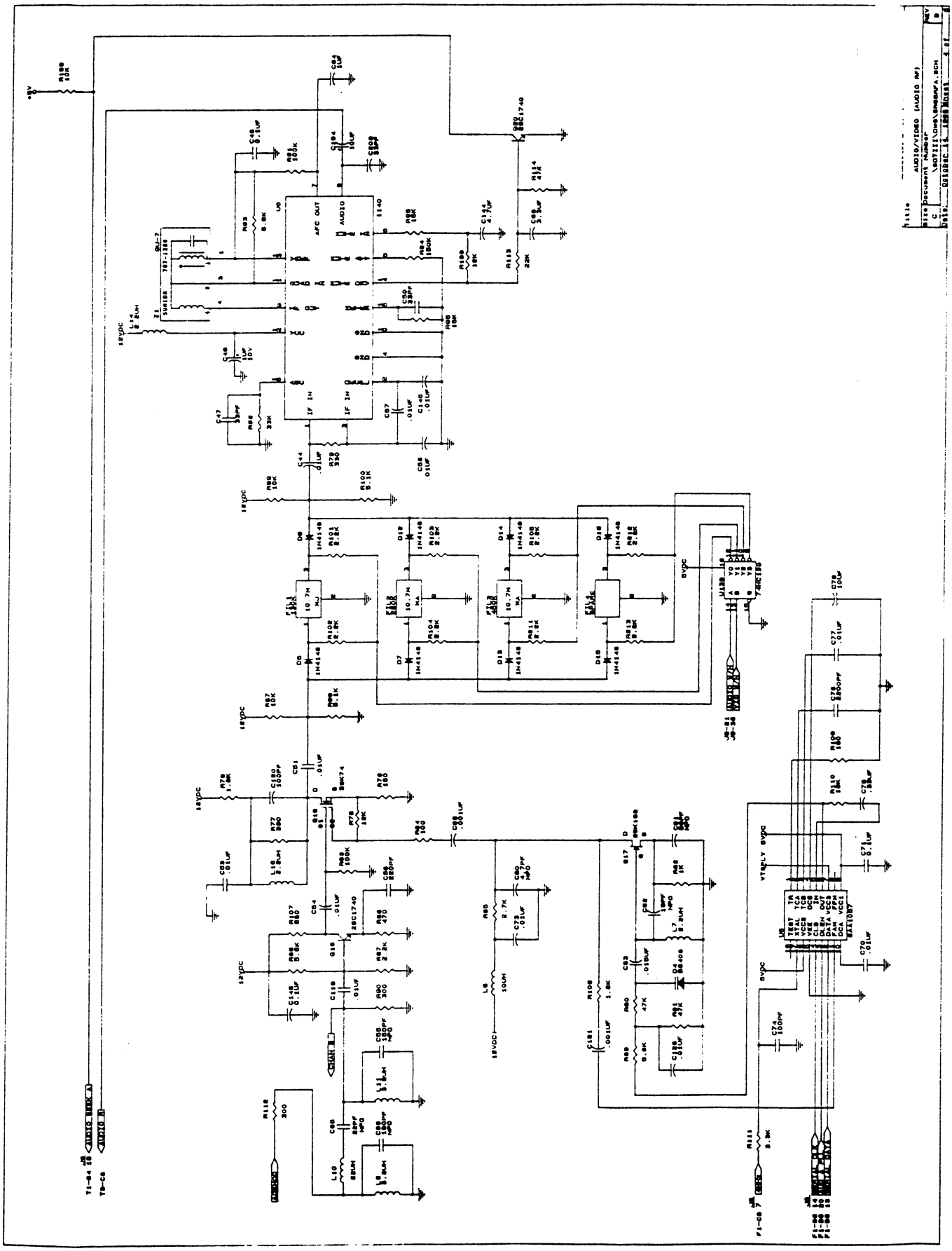


Figure 6. Right Audio (RF) Circuit Diagram

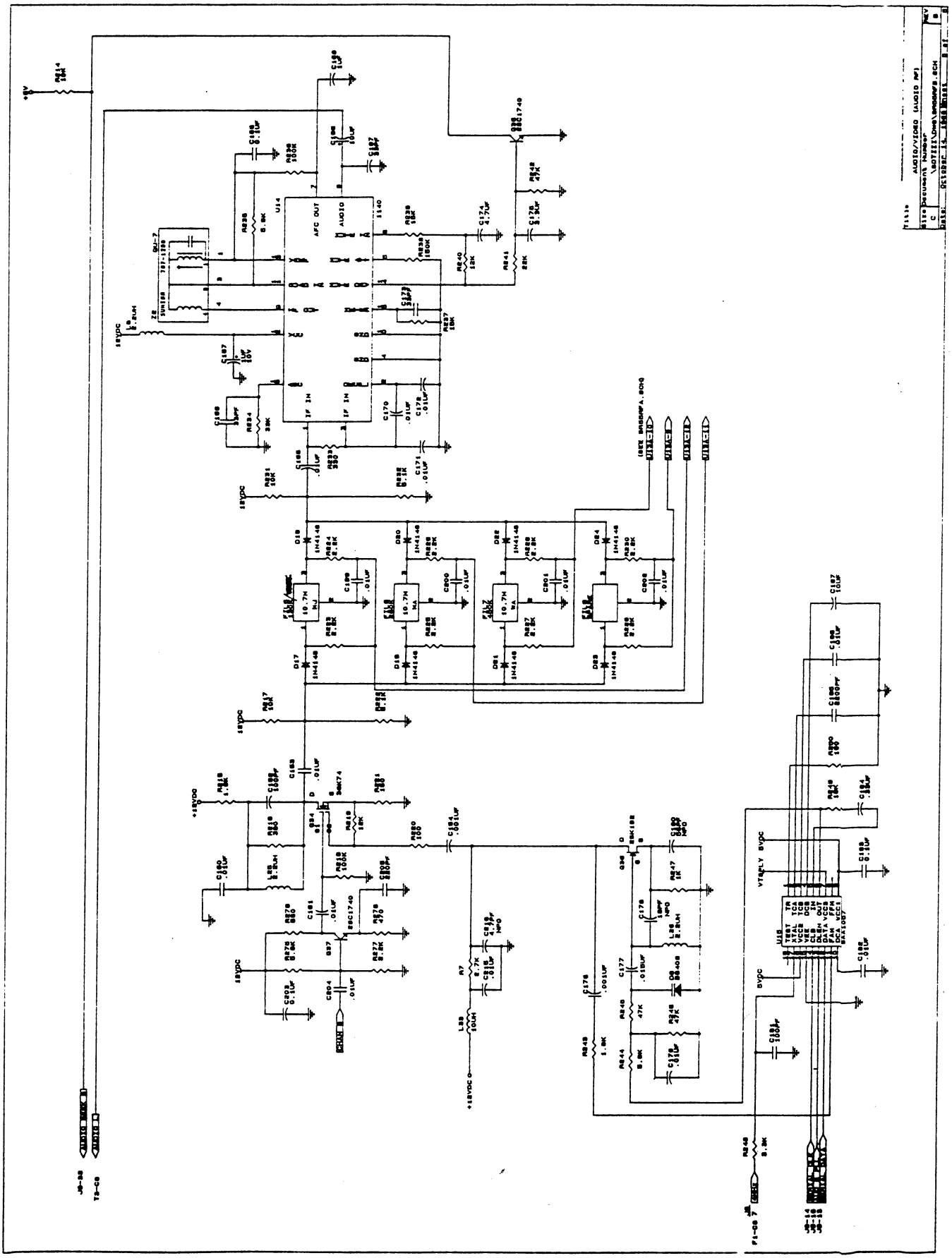


Figure 7. Left Audio (RF) Circuit Diagram

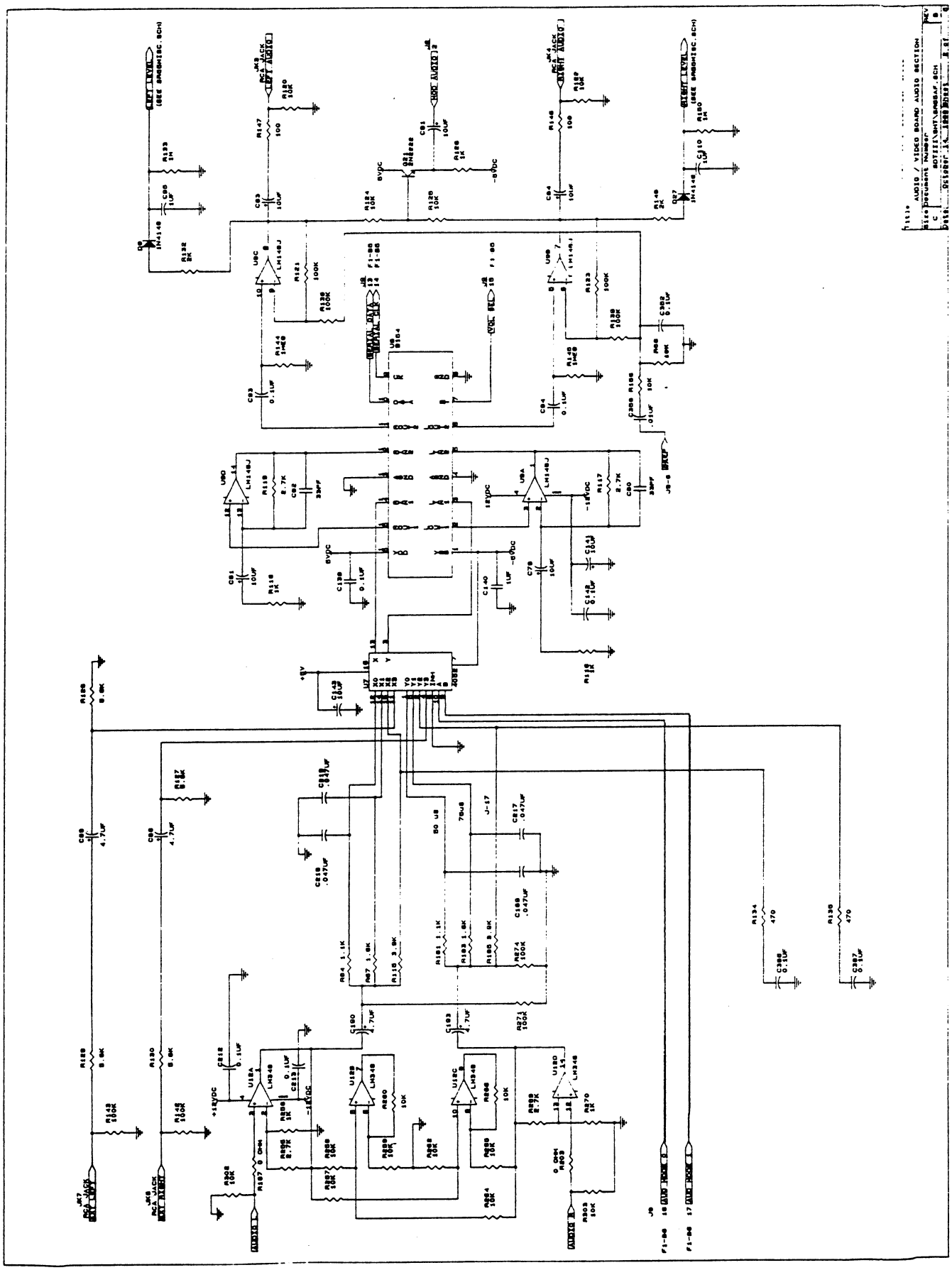


Figure 8. Audio Section of the A/V Board

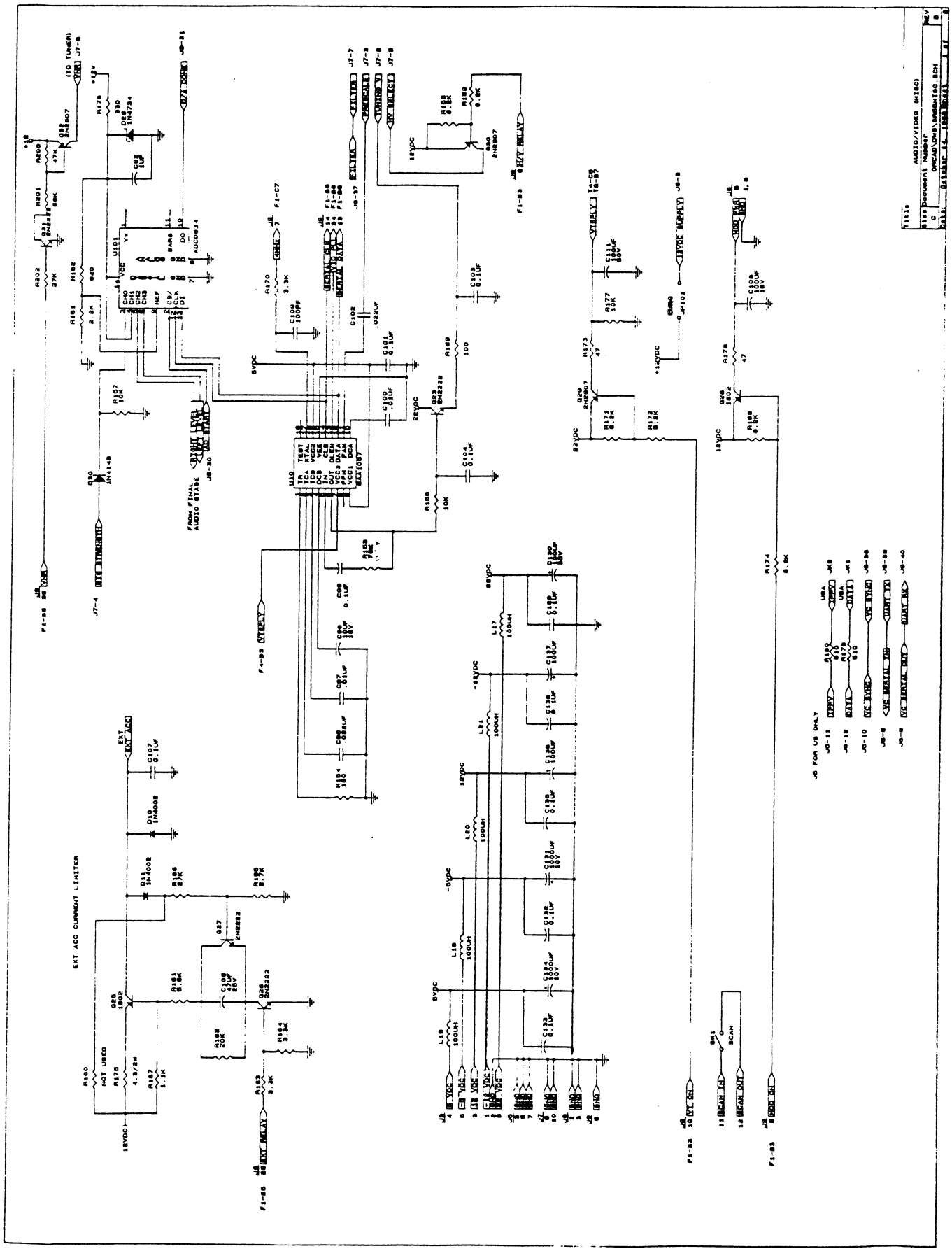


Figure 9. A/V Board (misc.)

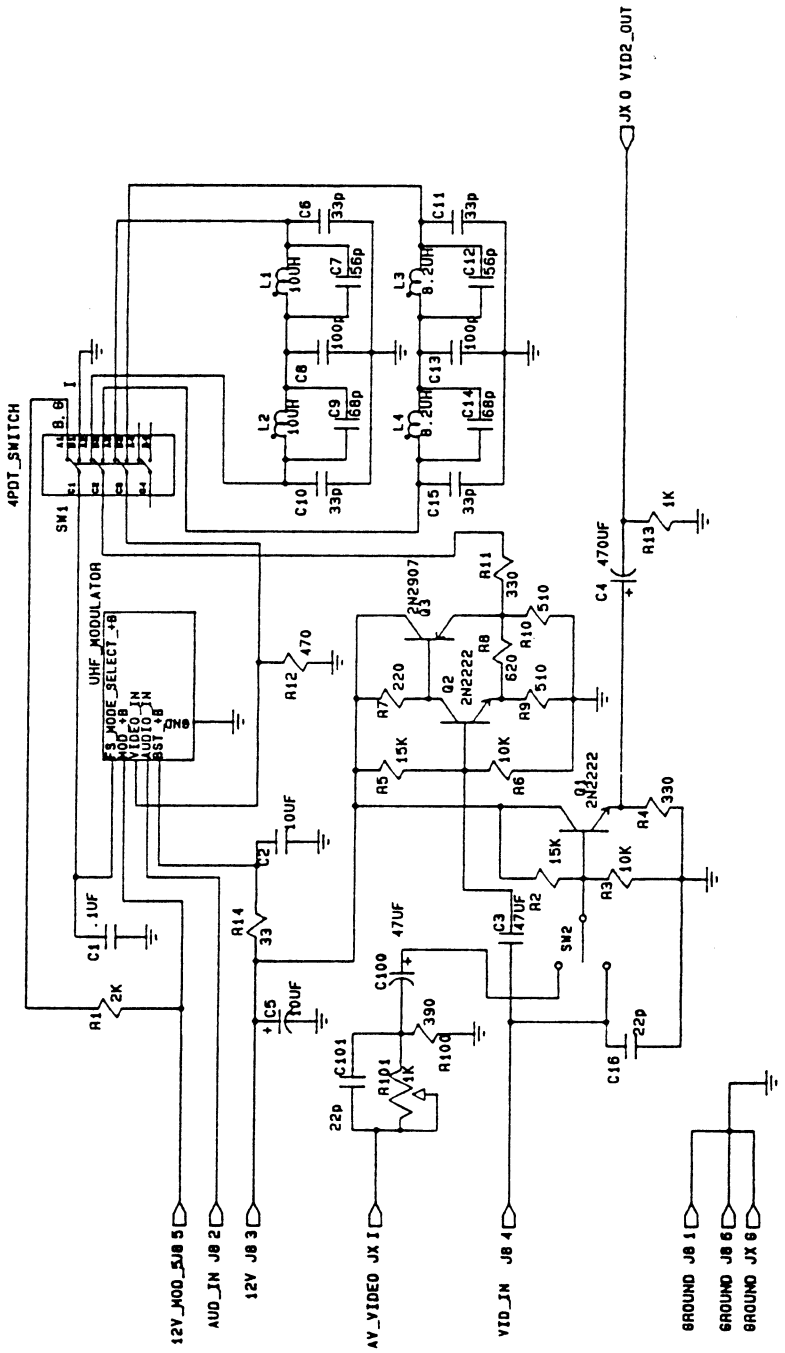


Figure 10. Modulator Interface Board

The CPU Circuit

The receiver uses a custom made 100 pin integrated circuit known as a gate array. The gate array performs the function of several ICs and components to provide higher reliability as well as additional area on the PCB. A 4 MHz clock is used by the gate array to process the data from all commands performed by the receiver.

The Z80 microprocessor uses a three bus system for data storage and information processing. The three bus system includes three control lines, 16 address lines and eight data lines. The control lines are used to select the proper I.C. for data to be written to or read from. The address lines are used to select the location in memory for information on the data lines to be written to or read from.

The Reset Circuit

There are two reset paths in the unit (Figure 11). A fast path and a slow path. The fast path half-wave rectifies the AC voltage through D7 and the resulting positive half-wave is seen at the base of Q4. The rectified voltage then turns Q4 **on** and **off** allowing C7 to charge and discharge at a rate below the voltage needed at the base of Q5 to turn it **on**. If AC power is interrupted Q4 remains **off**, allowing the 5 VDC supply to charge C7 until a high enough voltage is seen at the base of Q5 to turn it **on**. This allows the reset line to be pulled low.

The slow path half-wave rectifies the AC voltage through D6. The voltage is then seen at the wiper of VR1 allowing the reset to remain high. D12 is reverse biased by the 5 VDC supply on the cathode. If this voltage drops low enough to forward bias D12, the voltage on the wiper of VR1 will also drop causing reset to occur.

Clock Circuit

The CPU uses a 4 MHz crystal for the internal clock. This crystal oscillates due to a difference of voltage on either side of it, and provides the entire receiver with the timing pulse needed to process and transfer data.

The Battery Back-Up Circuit

The RAM (U7) used is a non-volatile memory, therefore, a battery is required to hold the memory when there is no power applied. When the regulated +5 VDC is applied to the anode of D2, it is forward biased. This will cause D1 to reverse bias and allow the +5 VDC to pass to U7 pin 28. When the +5 VDC drops below 3.2 VDC, D2 reverse biases. This causes D1 to forward bias and pass the 3.2 VDC from the battery to U7. This voltage is enough for U7 to hold memory.

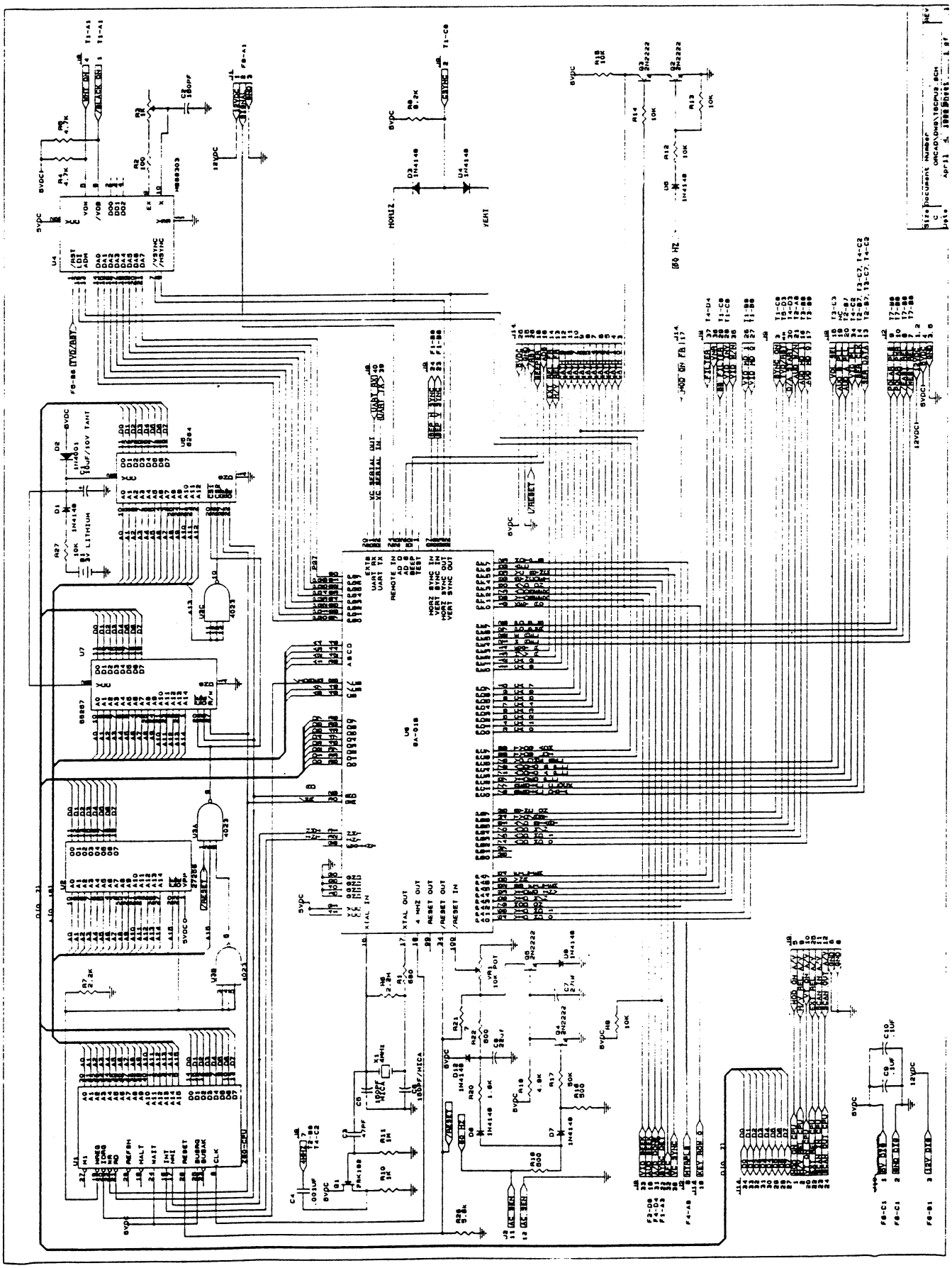


Figure 11. CPU Board

Display Board

The display board (Figure 12 and 13) uses momentary switches to operate the front panel control buttons. These buttons provide information to the gate array through J-14 pin 19. This is done by the use of a scanning matrix from the CPU to determine the button selected. DP1, the 2-digit 14-segment display and DP2, the 4-digit 7-segment display are driven by U1 (ULN2003), U2 (ULN2003), and U3, a 74LS273 data flip-flop. U1 and U2 select the proper digit of the display by providing a logic low to one of the pins 9-12 on DP1 and DP2. The proper segment is selected through U3 by providing a logic high on one of the pins 1-7 on DP1 and DP2.

The signal strength meter is controlled by providing a logic low on pins 1 and 12 of the bar graph through U2. An active low on pin 1 will enable pins 2-9 on the bar graph and an active low on pin 12 will enable pins 10 and 11. U3 receives the data from the gate array and provides a logic high to a combination of the pins 2-11 to select the proper LED's.

The front panel LEDs are selected by providing a logic low on the cathode of the LED through U1 and U2 and a logic high to the anode of the LED through U3.

Relay Board

The schematic for the relay board is shown in Figure 14. The ACT 1 and ACT 2 outputs of the actuator transformer are sent through a bridge circuit (KBPC25-02) on the relay board. The positive signal from the bridge is routed to relay K1 and the negative signal is routed to relay K2. The outputs of relay K1 are sent to relay K2 and the outputs of relay K2 are sent through connector J12 to the back of the unit.

Power Supply

The power supply (Figure 15) is designed to operate on 220/240 VAC, 50/60 Hz systems. The input AC voltage is changed to DC by the full-wave bridge rectifier BR1. Also, a voltage doubling process is accomplished by C5,C6. This voltage is applied to the primary winding of the flyback transformer, T1. The duty cycle voltage (square-wave) across the primary of T1 is controlled by Q1. Q1 is controlled by the IF sense on U1, pin 3.

U1 indirectly controls the secondary output voltages of T1 by the reference input voltage developed across the potentiometer, R4. An excessive high current drain will also be sensed by U1, which will then shut-down the input to the transformer through Q1 producing a "no power up" condition whenever a short or heavy current drain is detected anywhere in the system.

Do not attempt to troubleshoot or repair the power supply. If a problem is traced to the power supply, please replace the entire sub-assembly.

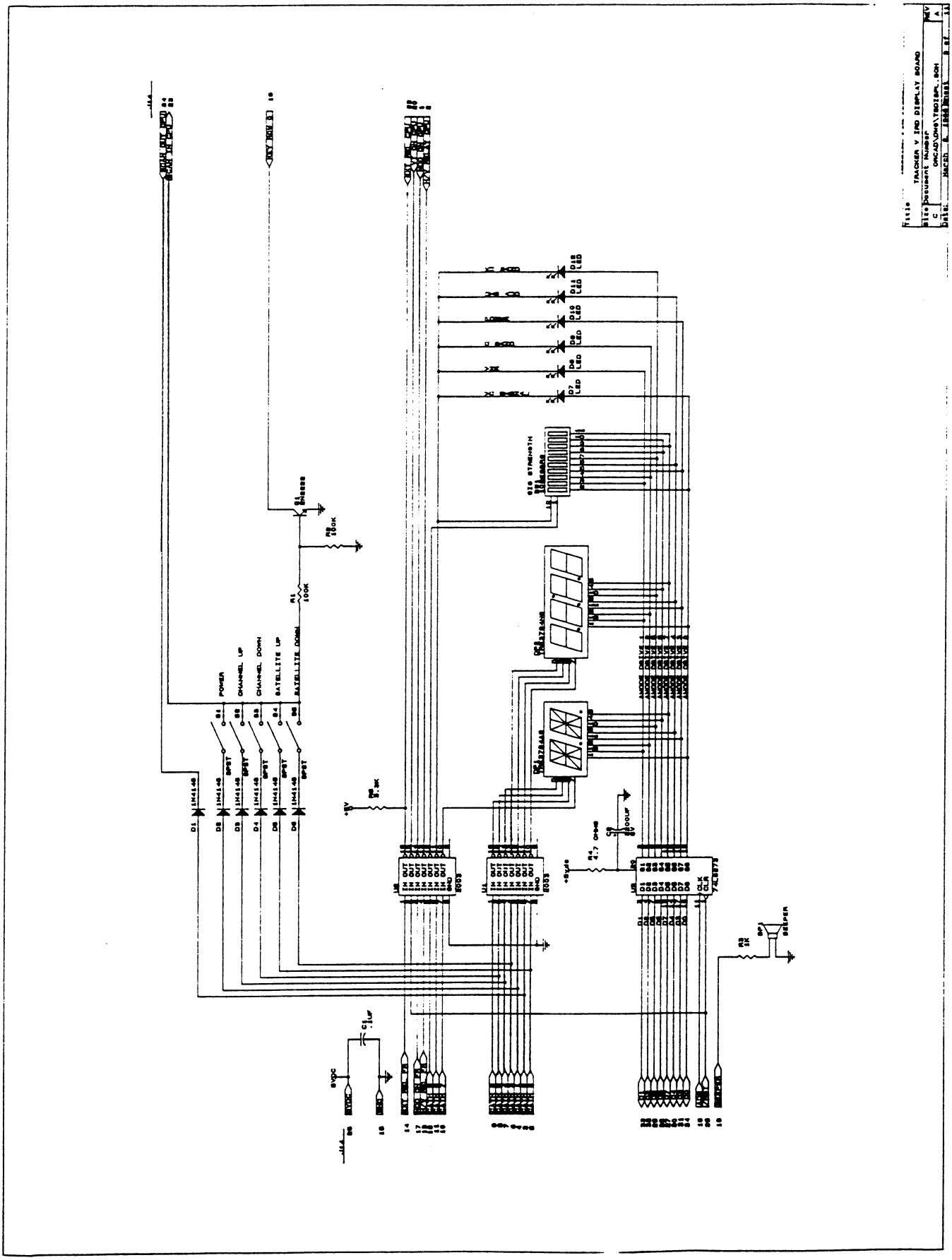
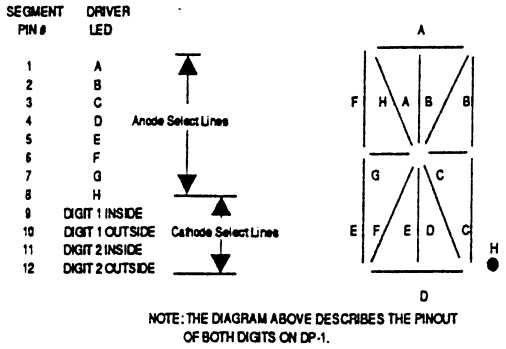


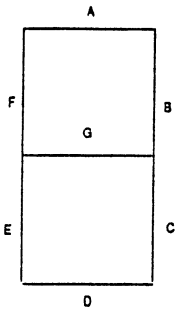
Figure 12. Display Board

PINOUT DIAGRAM FOR DP-1 14 SEGMENT DISPLAY

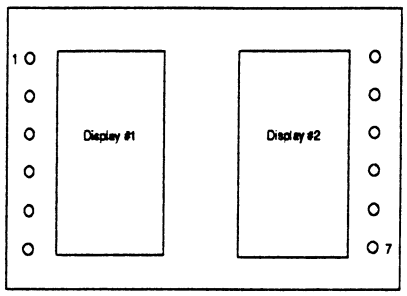


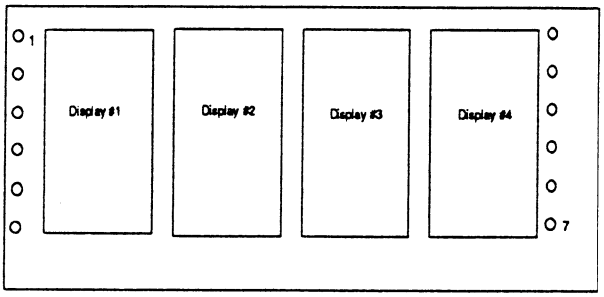
NOTE: THE DIAGRAM ABOVE DESCRIBES THE PINOUT OF BOTH DIGITS ON DP-1.

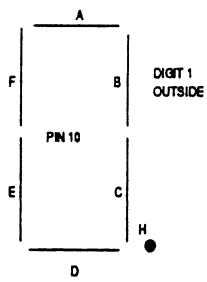
NUMERIC DISPLAY

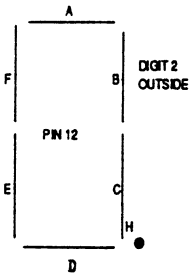


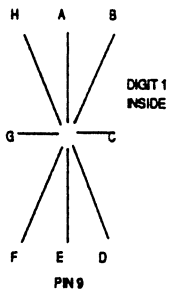
1. Anode A
2. Anode B
3. Anode C
4. Anode D
5. Anode E
6. Anode F
7. Anode G
8. Dec. Pt
9. Cathode 1
10. Cathode 2
11. Cathode 3
12. Cathode 4

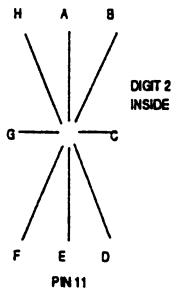




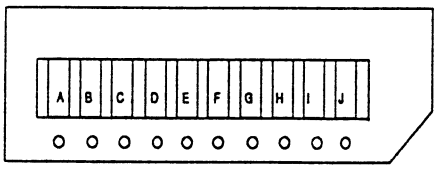








10 SEGMENT BAR GRAPH DISPLAY



1. Cathode (A-H)
2. Anode A
3. Anode B
4. Anode C
5. Anode D
6. Anode E
7. Anode F
8. Anode G
9. Anode H
10. Anode I
11. Anode J
12. Cathode (I-J)

Figure 13. Display Pin Outs

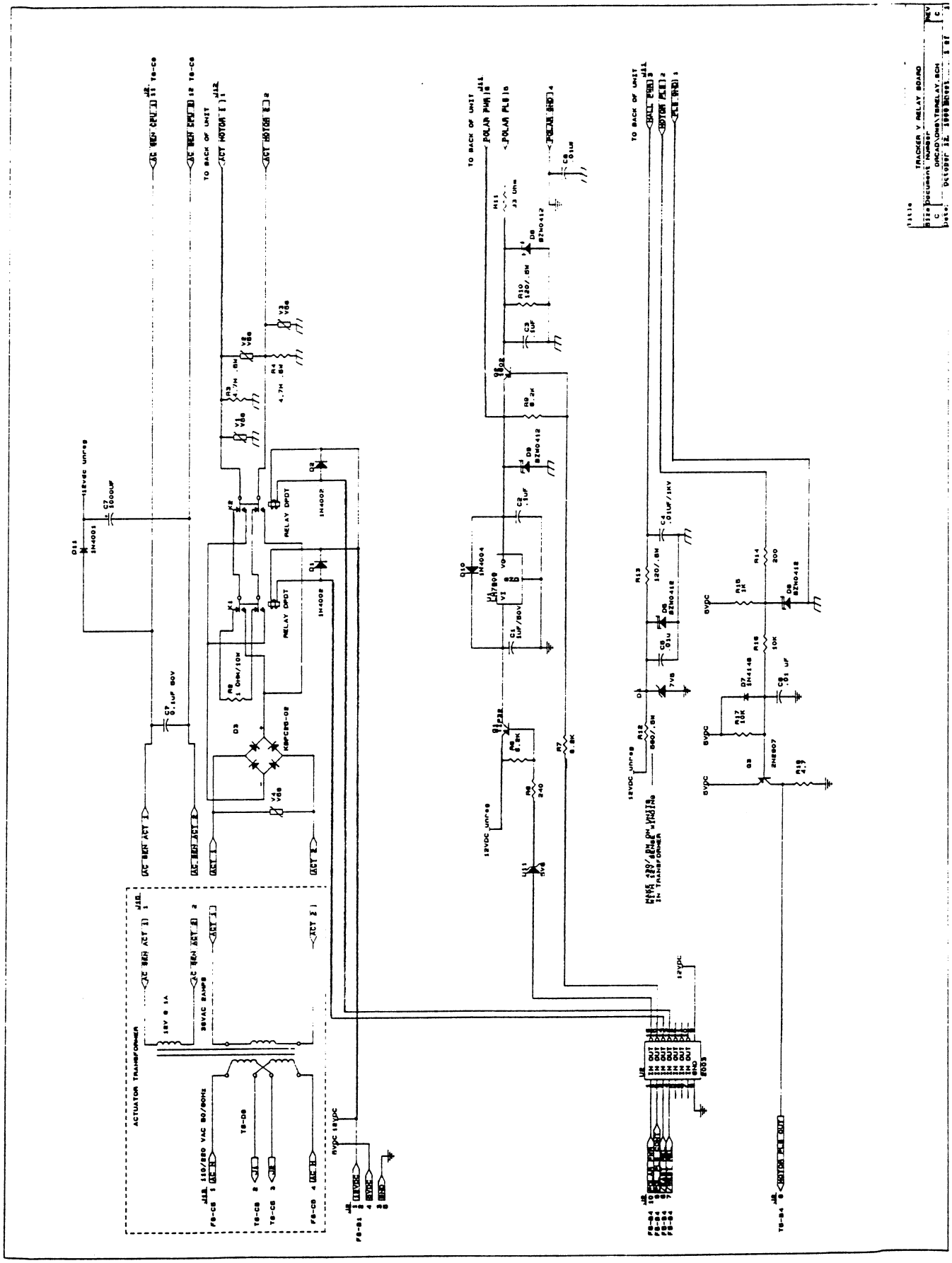


Figure 14. Relay Board

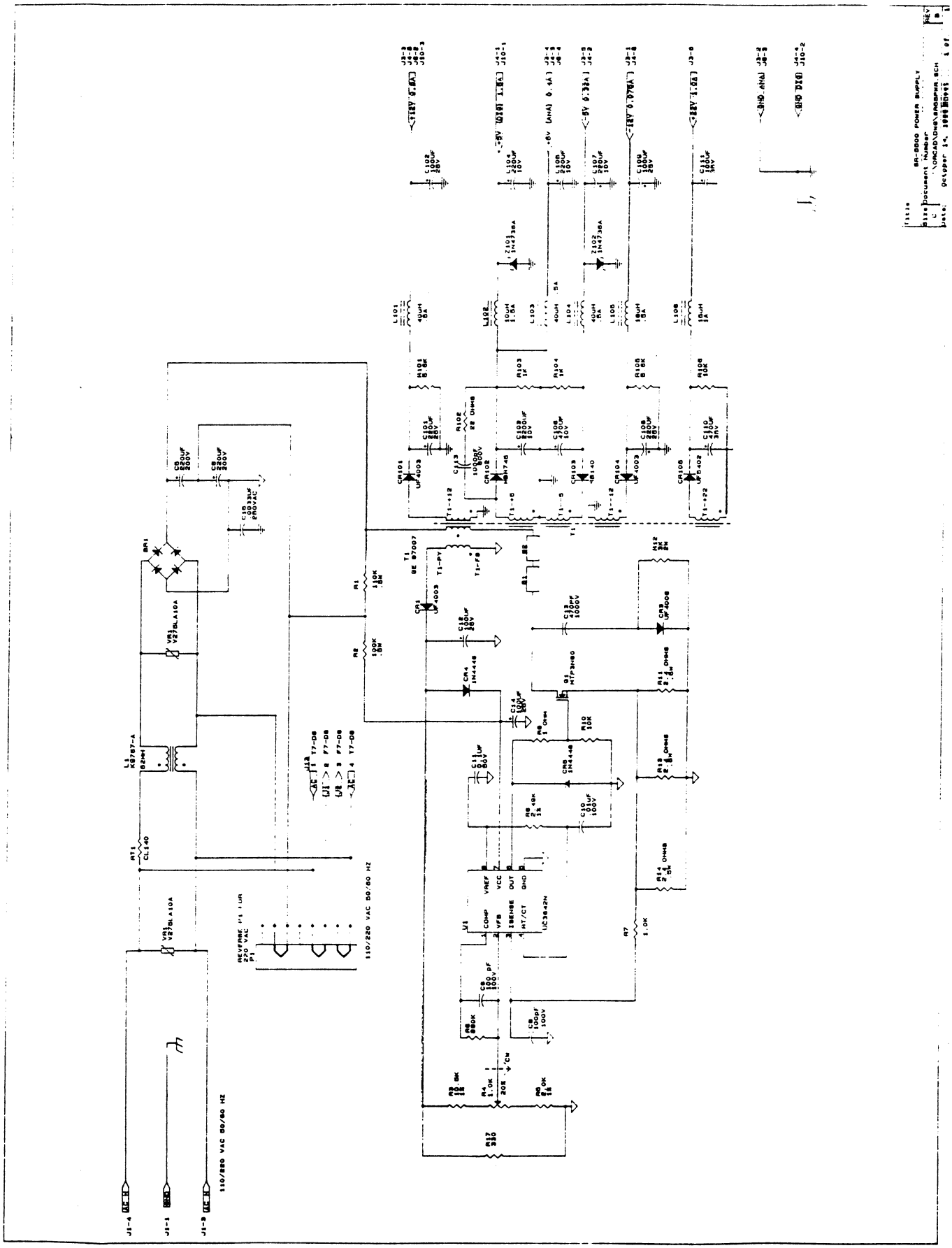


Figure 15. Power Supply Board

Appendix A

Adjustments

This section lists the A/V board and CPU board adjustments. It shows potentiometer designations and what they adjust.

A/V Board

VR1	Adjusts the sync detect voltage
VR2	Adjusts the video output
VR3	Adjusts baseband video
VR4	Adjusts low-end signal strength
VR4.1	Adjusts high-end signal strength

CPU Board

VR1	Adjusts reset
VR2	Adjusts graphics

Appendix B

Pin-Outs

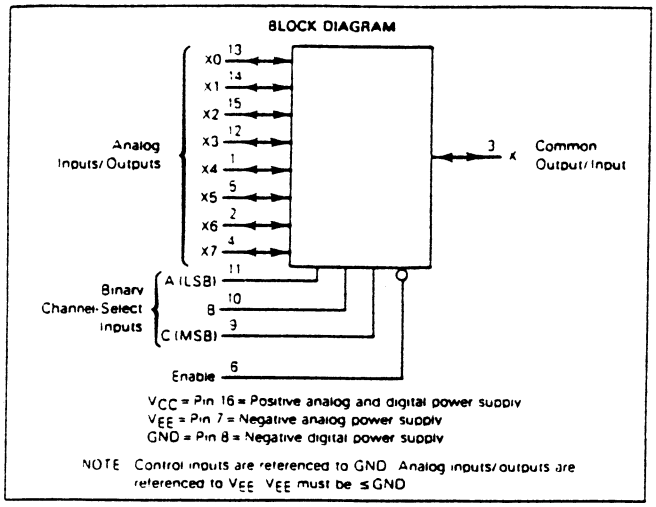
This section contains block diagrams, pin assignments and logic diagrams for the most common integrated circuits in the Echostar SR-5500 satellite receiver.

Included are:

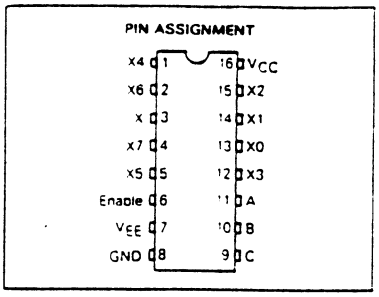
4051
4052
4053
6264
SAA1057
LM 339
4093
LM 348
MB88303
3842
2003
Z80
LA1140
27C256

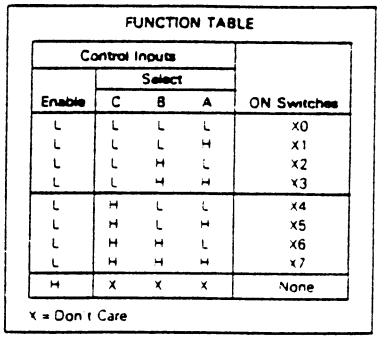
Also Included are:

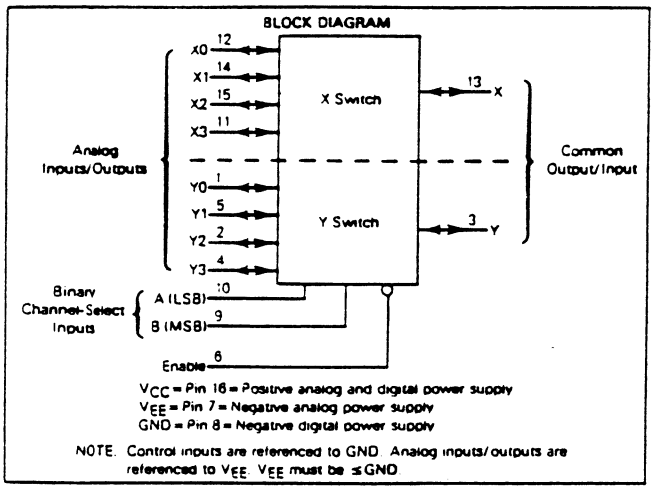
2SK192
PN2222
MPSH10
TIP 32
MTP3N80
3SK74
2N2907
2SC1740
1802


BLOCK DIAGRAM
Analog Inputs/Outputs
X0 13
X1 14
X2 15
X3 12
X4 1
X5 5
X6 2
X7 4
3 X
Common Output/Input
Binary Channel-Select Inputs
A (LSB) 11
B 10
C (MSB) 9
Enable 6
VCC = Pin 16 = Positive analog and digital power supply
VEE = Pin 7 = Negative analog power supply
GND = Pin 8 = Negative digital power supply
NOTE Control inputs are referenced to GND Analog inputs/outputs are referenced to VEE VEE must be ≤GND

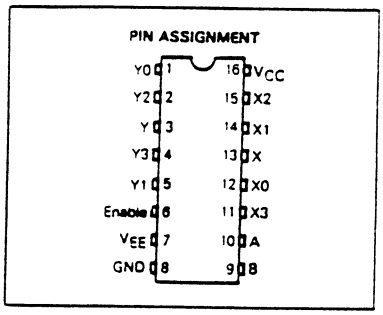
4051

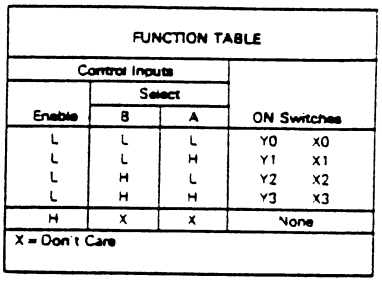


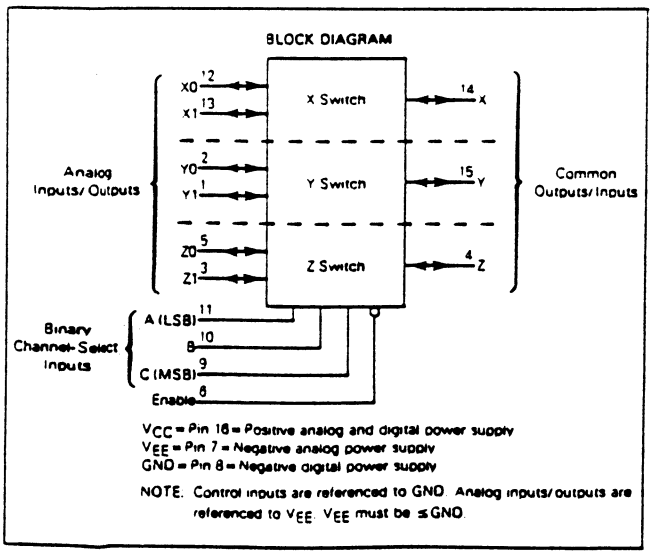

FUNCTION TABLE
Control Inputs
Select
Enable C B A ON Switches
L L L L X0
L L L H X1
L L H L X2
L L H H X3
L H L L X4
L H L H X5
L H H L X6
L H H H X7
H X X X None
X = Don't Care



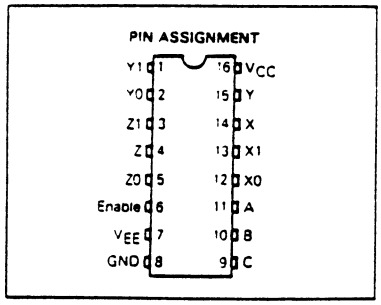
4052

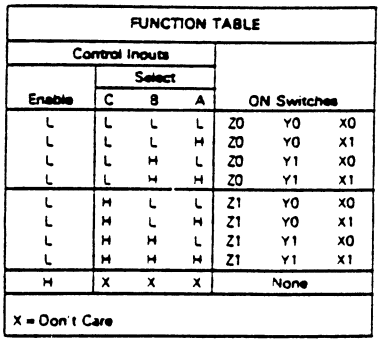




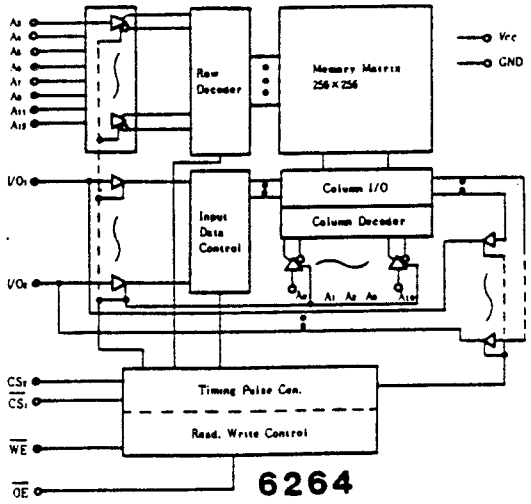


4053

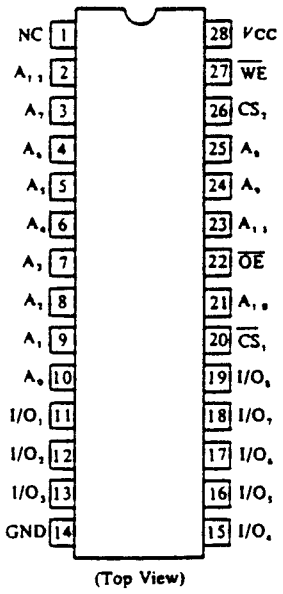



FUNCTION TABLE
Control Inputs
Select
Enable C B A ON Switches
L L L L Z0 Y0 X0
L L L H Z0 Y0 X1
L L H L Z0 Y1 X0
L L H H Z0 Y1 X1
L H L L Z1 Y0 X0
L H L H Z1 Y0 X1
L H H L Z1 Y1 X0
L H H H Z1 Y1 X1
H X X X None
X = Don't Care

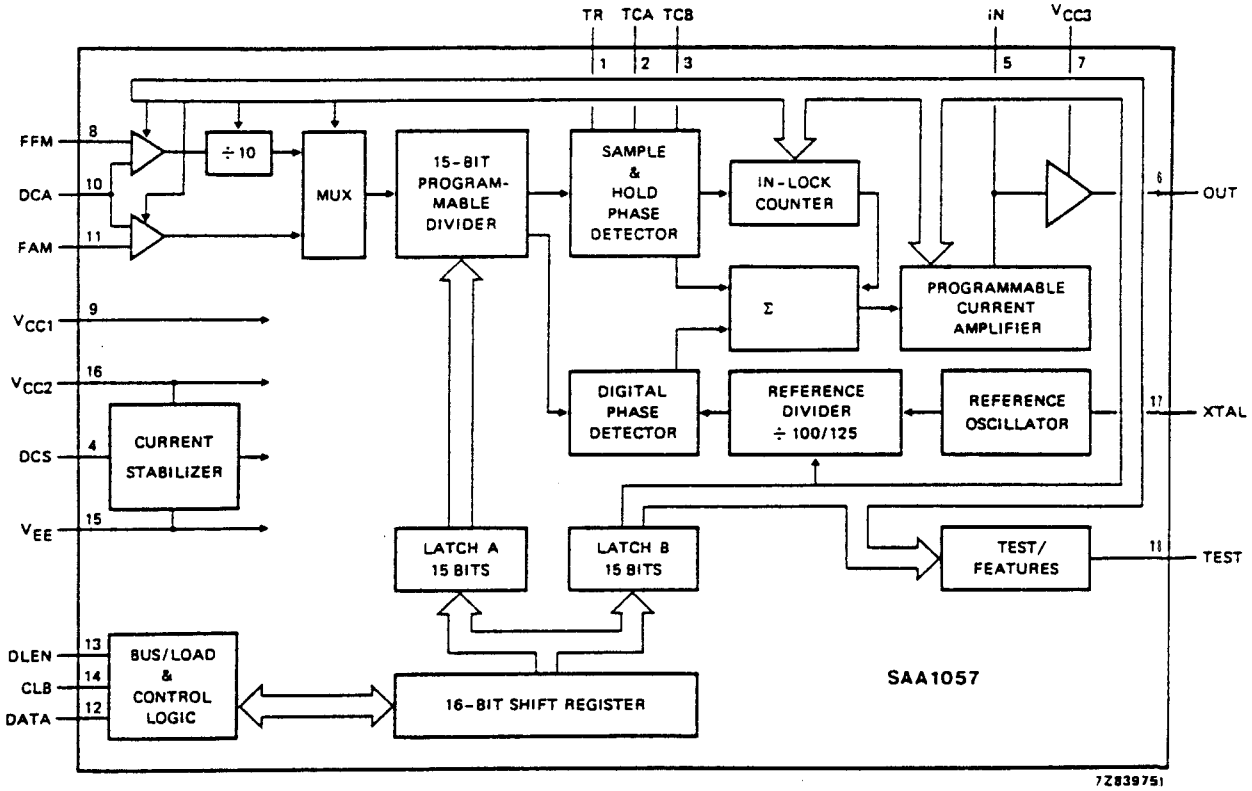
■ BLOCK DIAGRAM

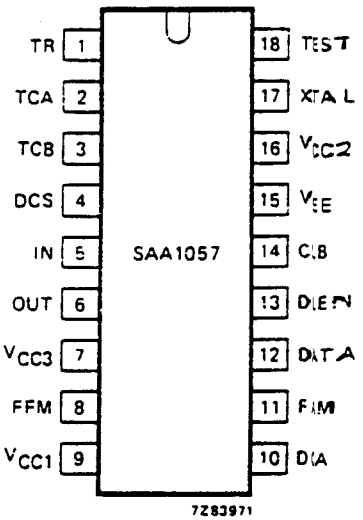


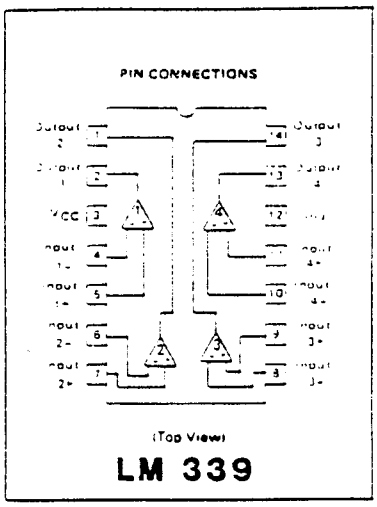
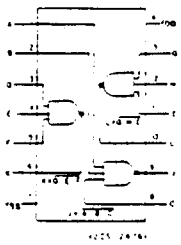
■ PIN ARRANGEMENT

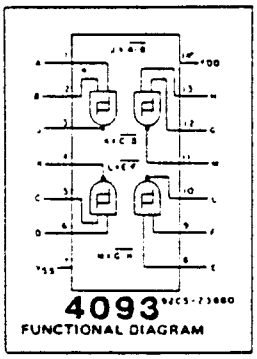


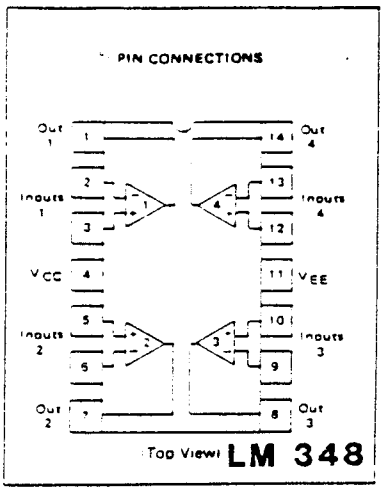
(Top View)

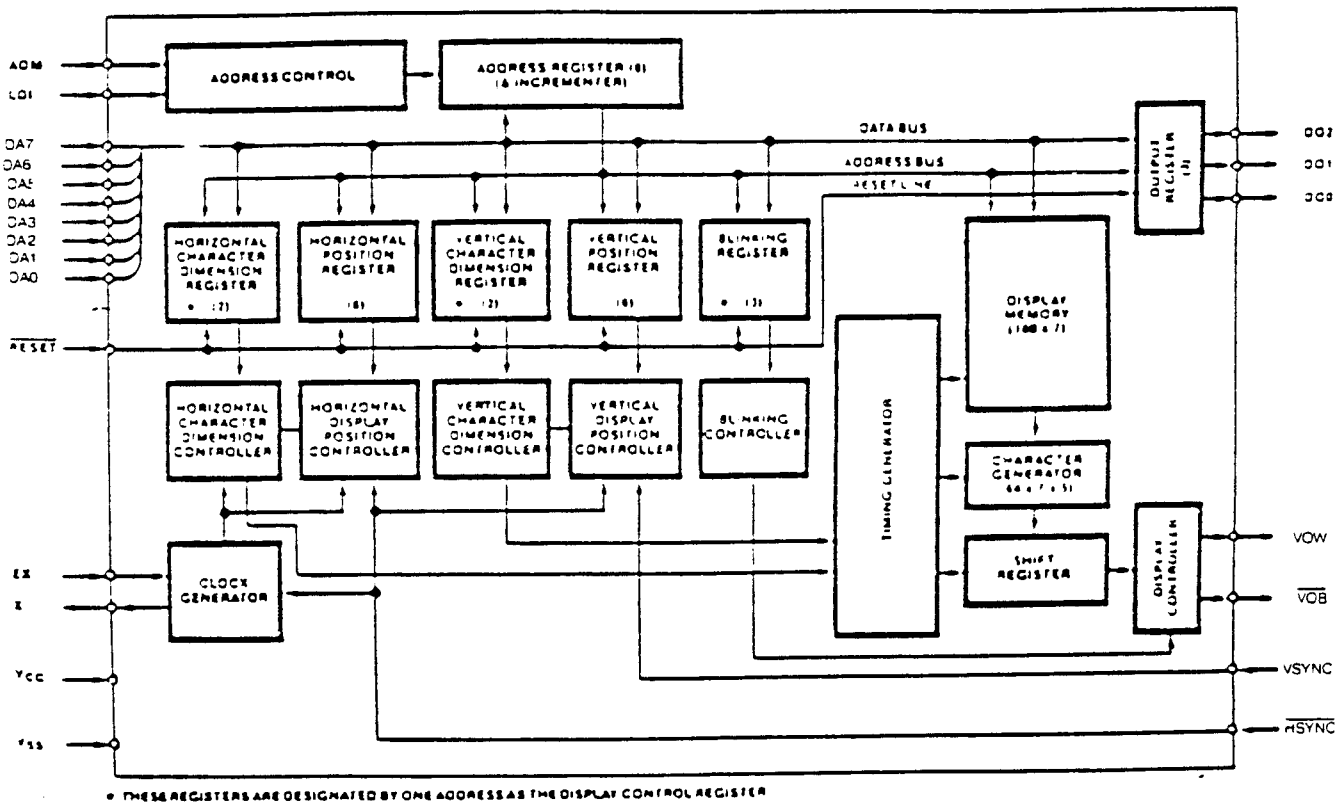


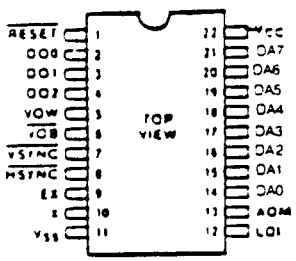


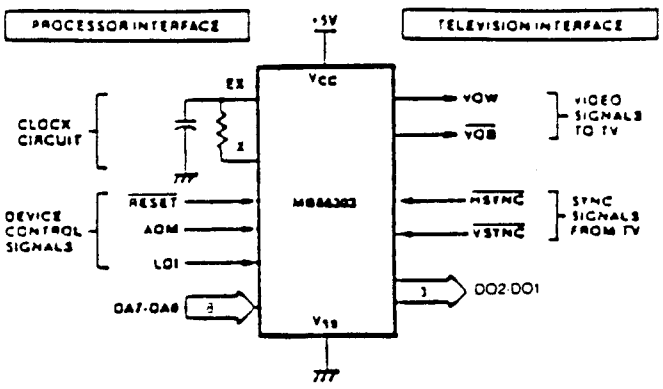

PIN CONNECTIONS
(Top View)
LM 339

CD4023AH


4093
FUNCTIONAL DIAGRAM


PIN CONNECTIONS
Top View
LM 348


ADDRESS CONTROL
DATA BUS
ADDRESS BUS
RESET LINE
HORIZONTAL CHARACTER DIMENSION REGISTER
HORIZONTAL POSITION REGISTER
VERTICAL CHARACTER DIMENSION REGISTER
VERTICAL POSITION REGISTER
BLINKING REGISTER
HORIZONTAL CHARACTER DIMENSION CONTROLLER
HORIZONTAL DISPLAY POSITION CONTROLLER
VERTICAL CHARACTER DIMENSION CONTROLLER
VERTICAL DISPLAY POSITION CONTROLLER
BLINKING CONTROLLER
TIMING GENERATOR
DISPLAY MEMORY
CHARACTER GENERATOR
SHIFT REGISTER
CLOCK GENERATOR
VOW
VOB
VSYNC
HSYNC
THESE REGISTERS ARE DESIGNATED BY ONE ADDRESS AS THE DISPLAY CONTROL REGISTER

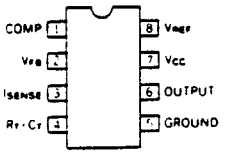

TOP VIEW


PROCESSOR INTERFACE
TELEVISION INTERFACE
CLOCK CIRCUIT
DEVICE CONTROL SIGNALS
VIDEO SIGNALS TO TV
SYNC SIGNALS FROM TV
MB88303

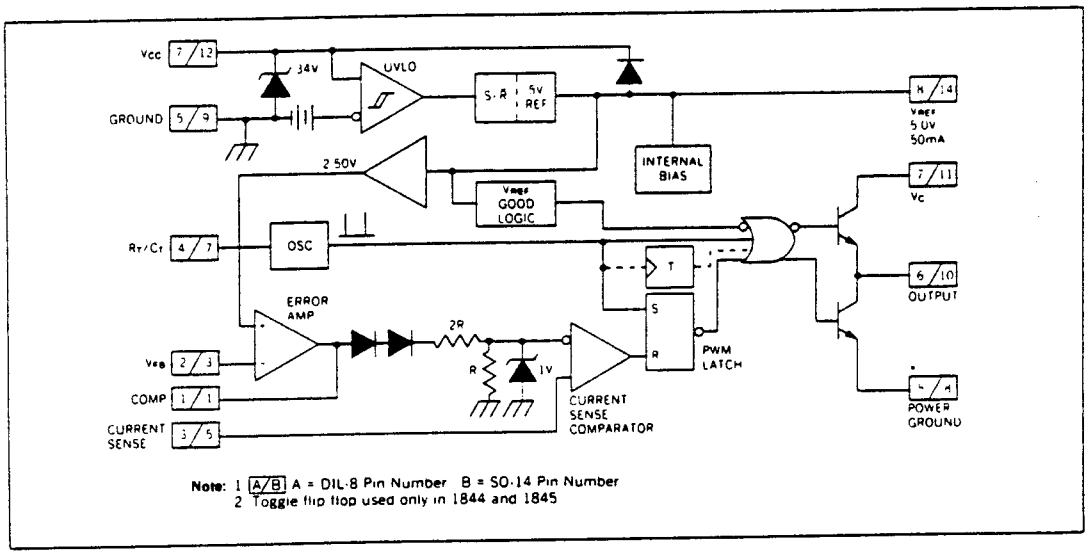
MB88303

UC3842

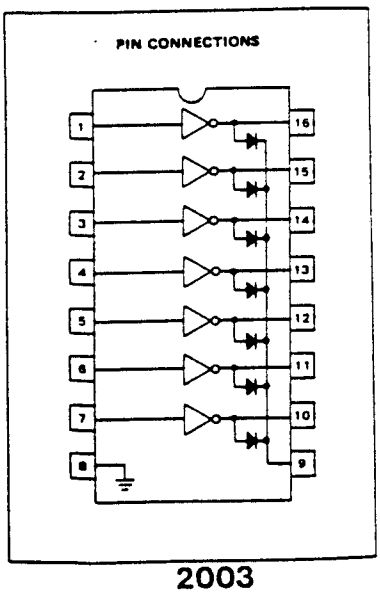
CONNECTION DIAGRAM
DIL-8 (TOP VIEW)
N or J PACKAGE



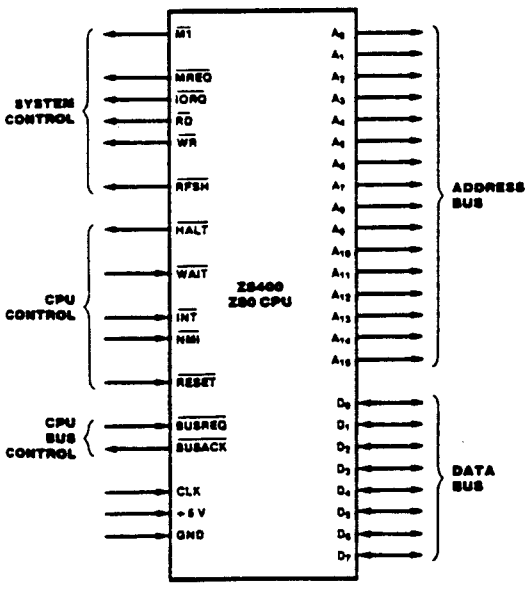
BLOCK DIAGRAM



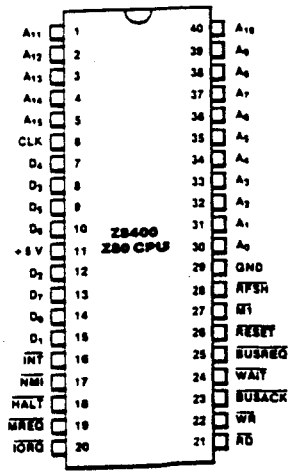
Note: 1 A/B A = DIL-8 Pin Number B = SO-14 Pin Number
2 Toggle flip flop used only in 1844 and 1845



2003

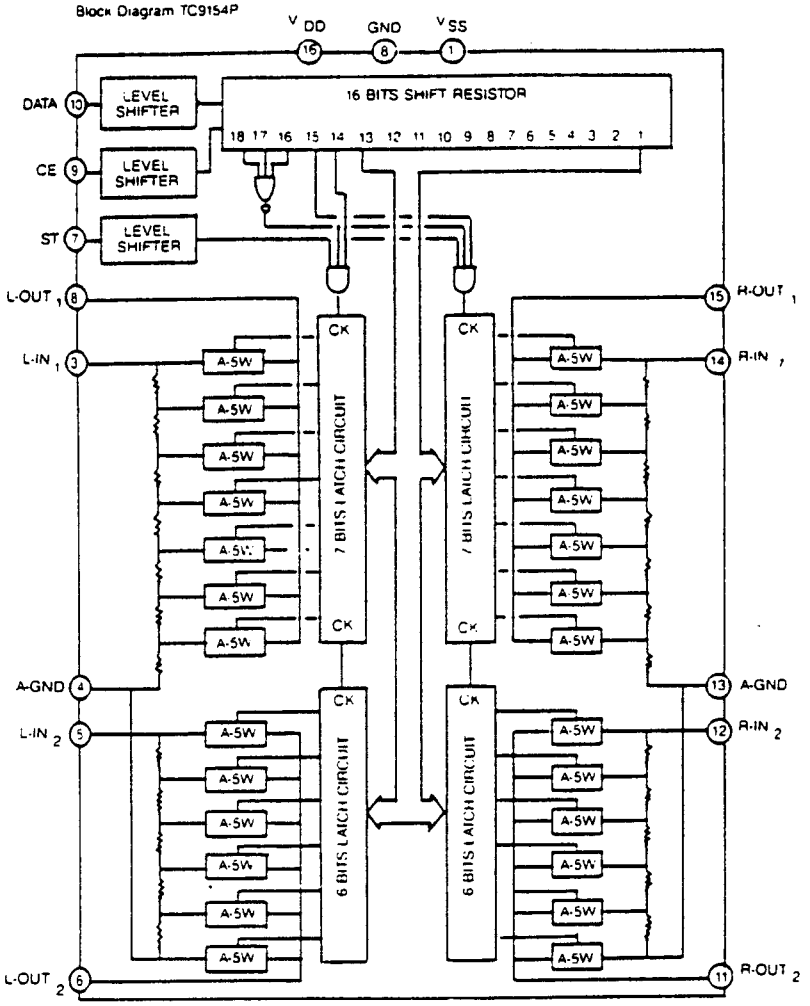


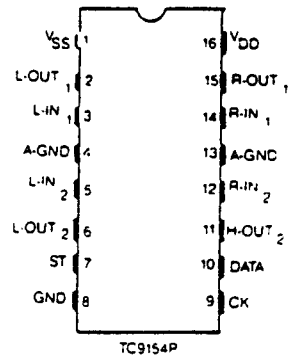
Pin Functions



40-Pin Dual-In-Line Package (DIP)
Pin Assignments

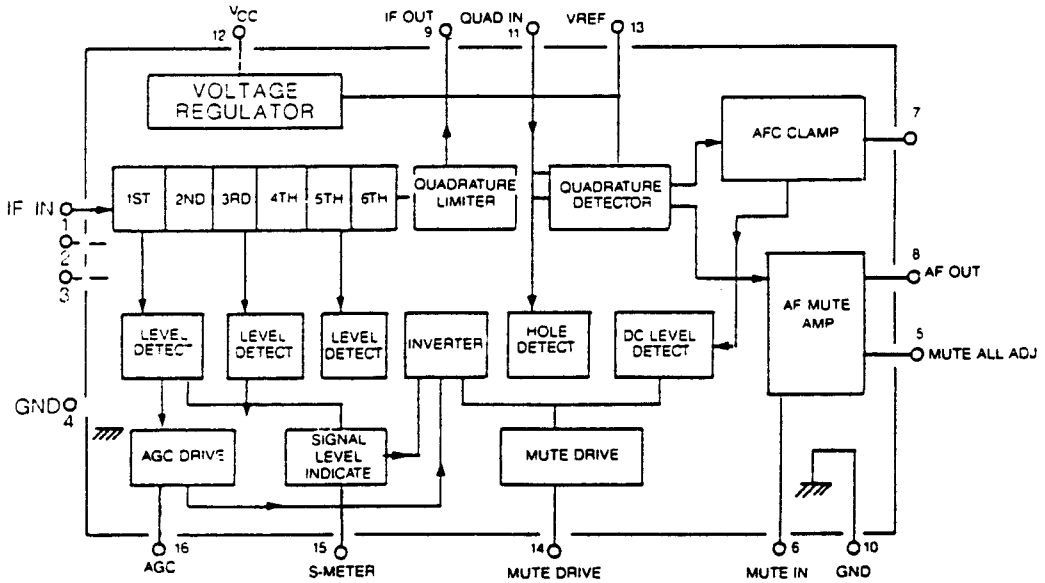
Block Diagram TC9154P

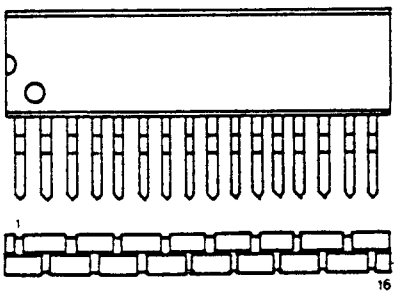




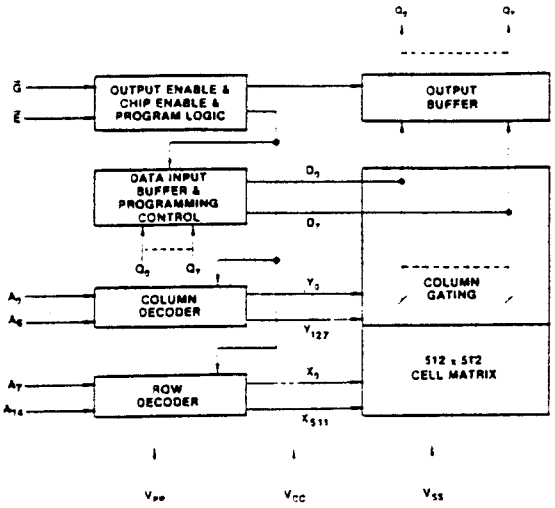
LA1140

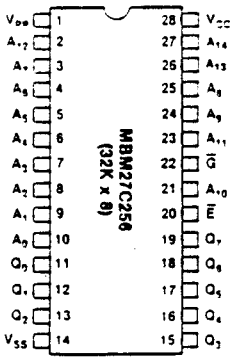
EQUIVALENT CIRCUIT BLOCK DIAGRAM

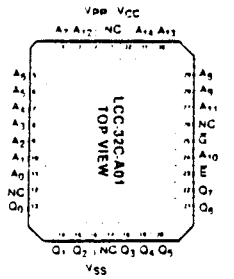




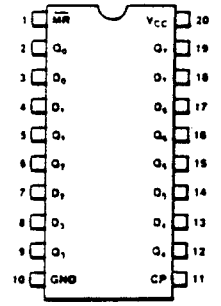
MBM27C256 Block Diagram and Pin Assignments





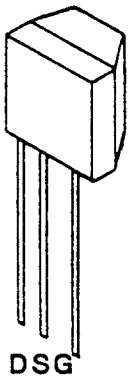


CONNECTION DIAGRAM
DIP (TOP VIEW)

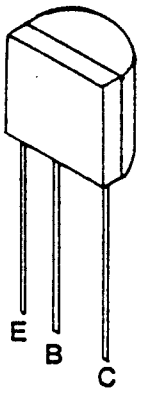


J Suffix — Case 732-03 (Ceramic)
N Suffix — Case 738-01 (Plastic)

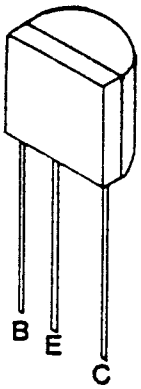
2SK192



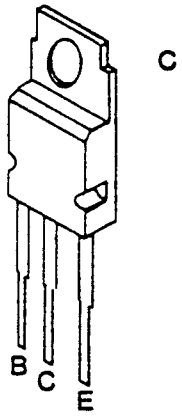
PN2222



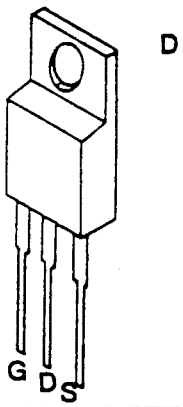
MPSH10



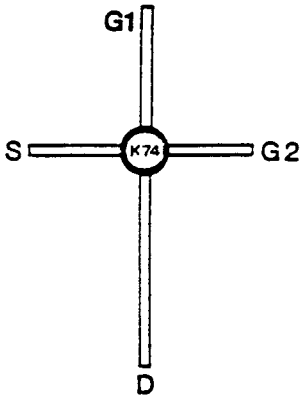
TIP32



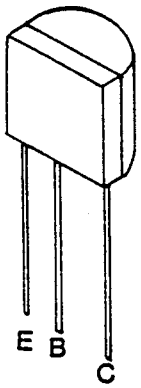
MTP3N80



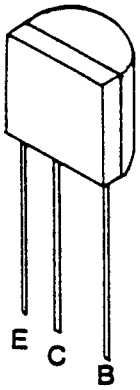
3SK74



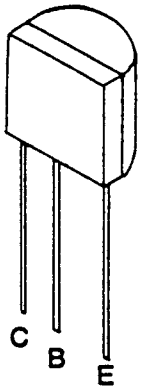
2N2907



2SC1740



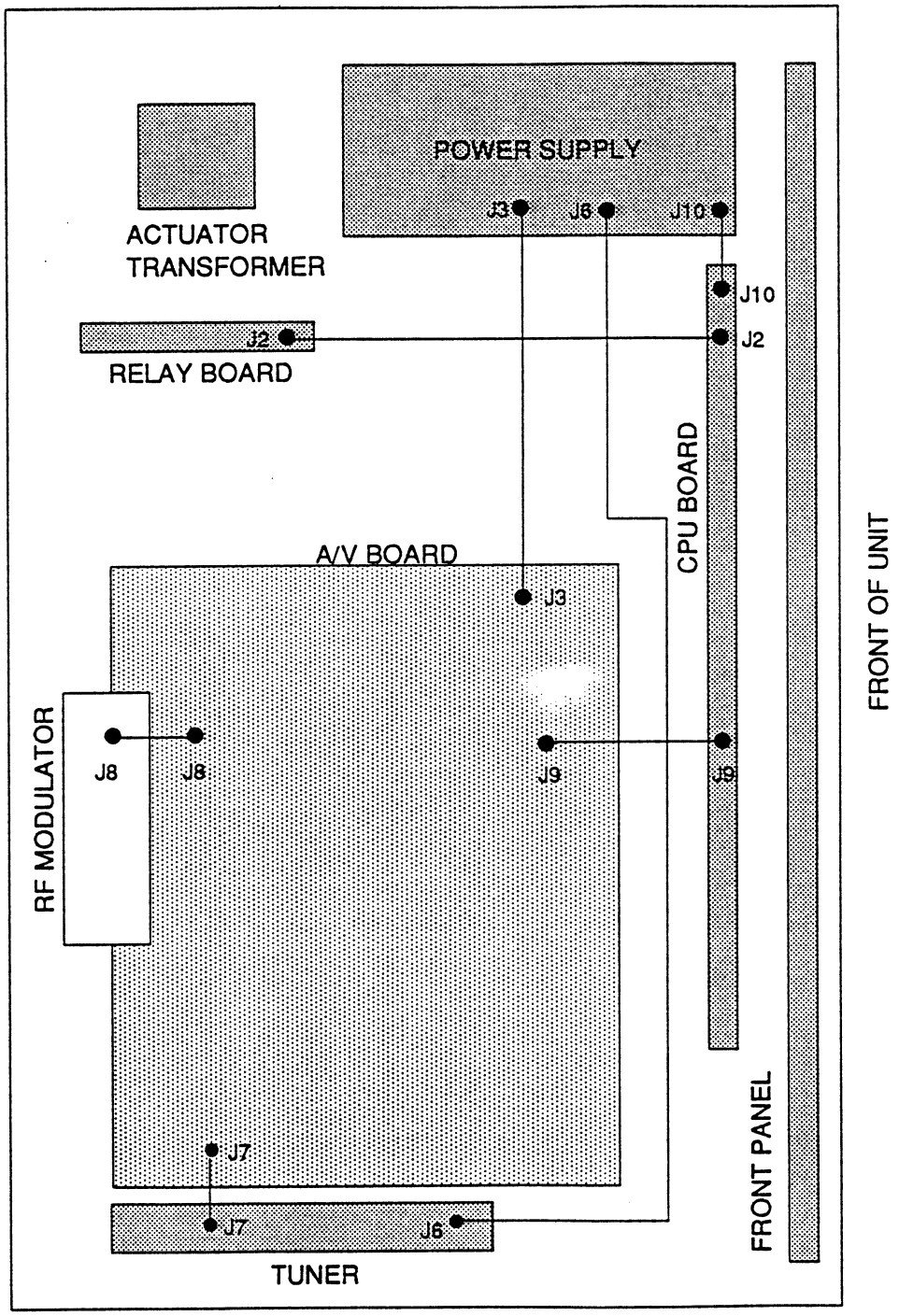
1802



Appendix C

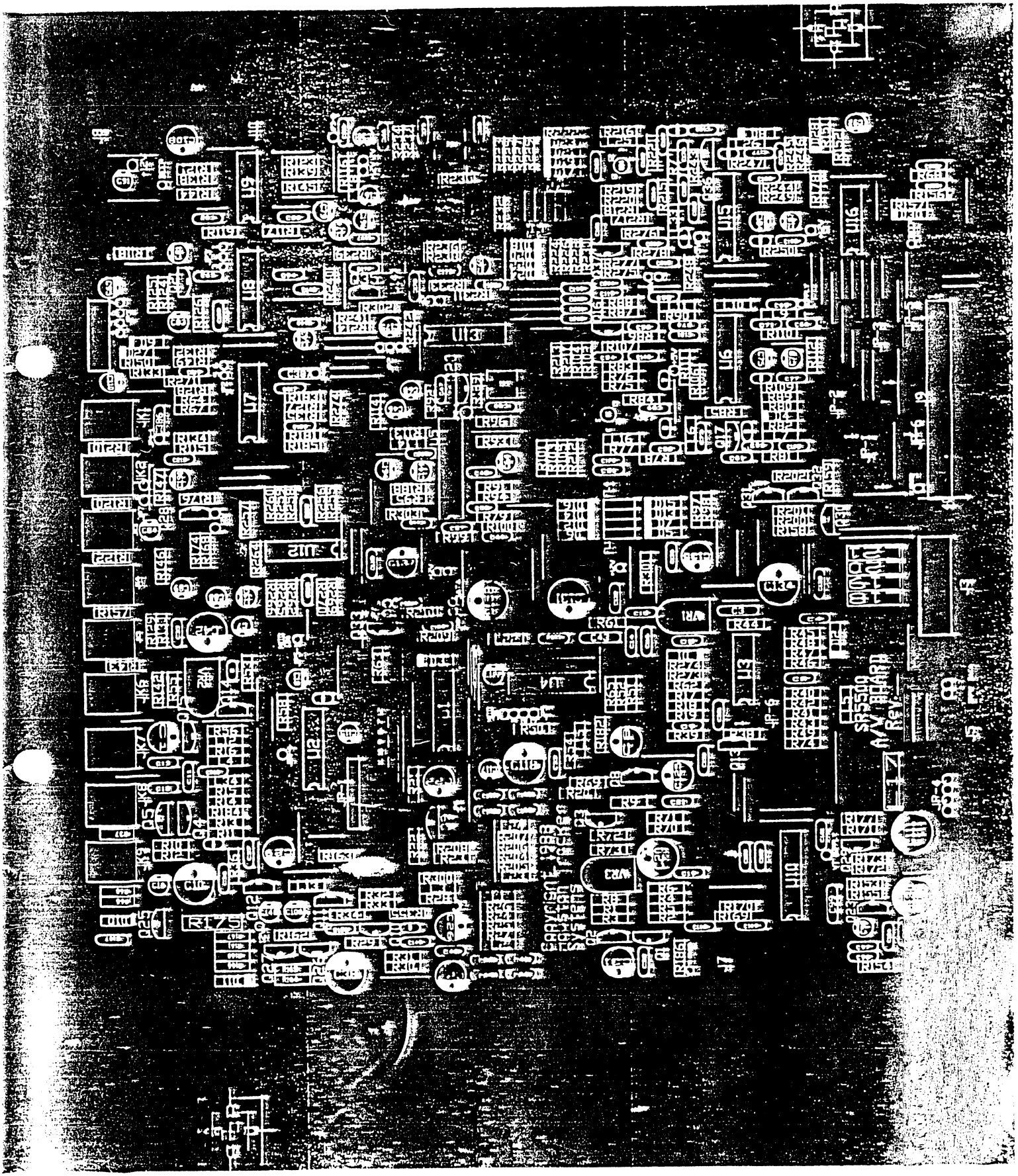
Component Locations

Included in this section are component location charts for the SR-5500 satellite receiver.

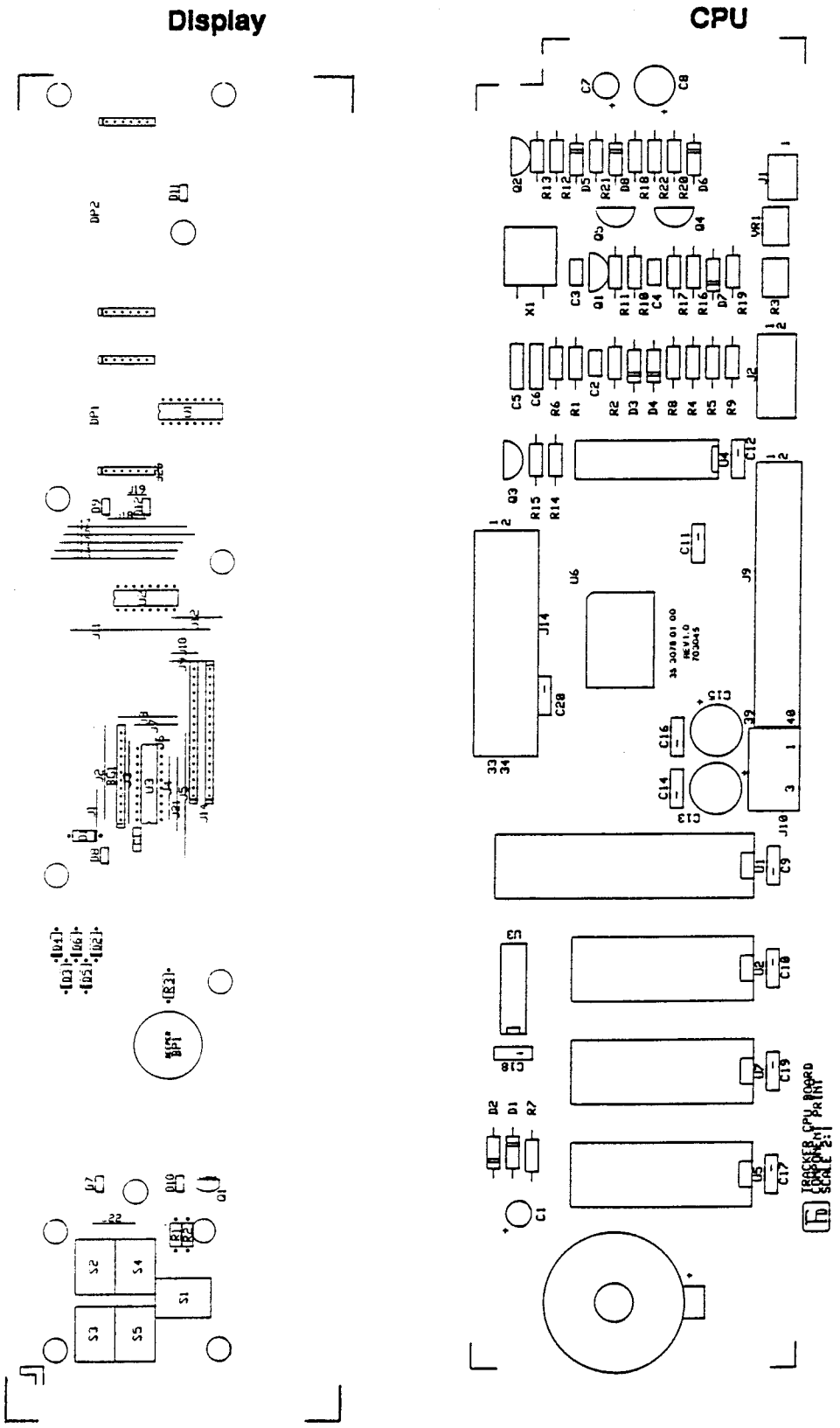


INTERNAL VIEW OF THE SR-5500

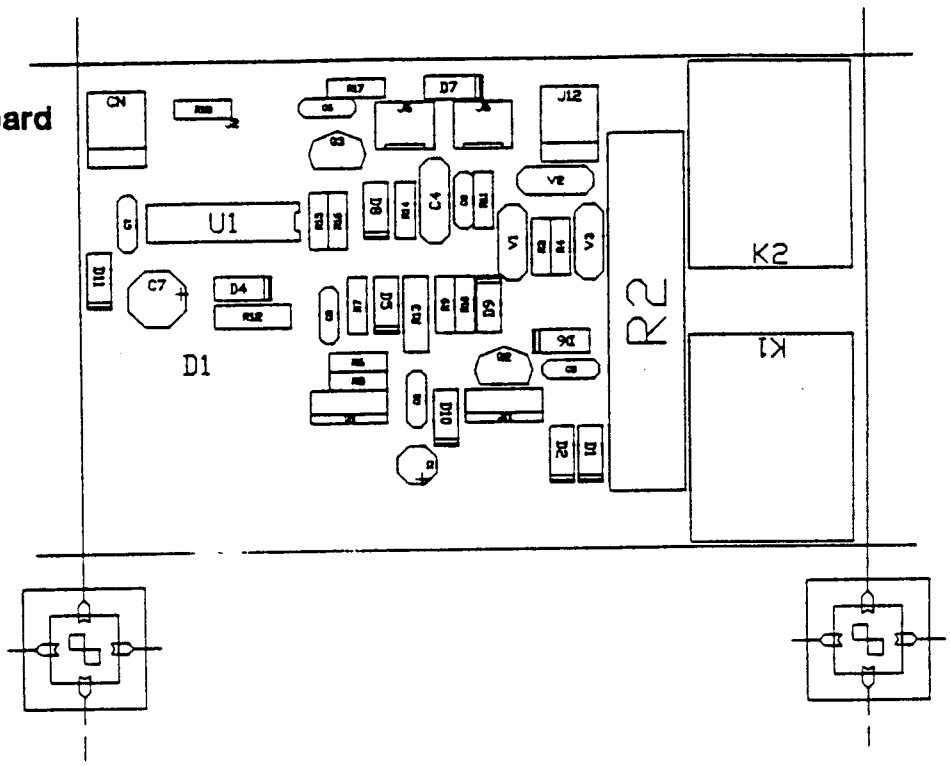
A/V Locator Guide



CPU Board



Relay Board



Appendix D

Specifications

1.0 Power Supply

Voltage Rating:	240 VAC +/- 5.0%; 50/60 Hz; 160 W. (Protection Class I.)
Power Inlet:	IEC 3-pin connector with built-in isolation switch and fuse holders.
Fuses:	
Electronics	F 1.00 Amp; 250 V
Antenna Positioner	T 3.15 Amp; 250 V
On-Off Switch:	Integral with the IEC 3-pin power inlet assembly.
LNB Power:	21 VDC regulated; 400 mA. Short circuit protected.
Actuator Motor Drive:	36 VDC at 3.9 A (polarity reversing). Not for continuous operation.
Sensor Power:	7.5 VDC at 100 mA. Short circuit protected.
Servo Power:	6.0 VDC regulated at 0.8 amps. Short circuit protected.

2.0 TUNER/DEMODULATOR

Input Frequency:	950 to 1750 MHz.
Input Signal Level:	-75 dBm to -30 dBm.
IF Inputs:	Programmable for FSS, DBS, Telecom, and C-Band LNBs. (Optional module available for voltage switching LNBs).
Connectors:	(2) Female F-type.
Input Impedance:	75 ohms.
Carrier to Noise Threshold:	> 7dB (typical).
Intermediate Frequency (IF):	479.5 MHz.
IF Bandwidth:	Programmable; 22 and 27 MHz.
Image Rejection:	20 dB.
Tuning Range:	800 MHz continuous (950 - 1750 MHz).
Threshold Extension:	Programmable: Bandwidth Reduction Filter (BRF); and optional Threshold Extension Filter (TEF).
AGC Range:	40 dB minimum.

3.0 VIDEO

3.1 VIDEO I Output

Video Signal:	Clamped, filtered, de-emphasized.
Format:	PAL B/G or I; SECAM; NTSC.
De-Emphasis:	
PAL	CCIR Rec 405 625 lines.
SECAM	CCIR Rec 405 625 lines.
NTSC	CCIR Rec 405.1 525 lines.
Output Impedance:	75 ohms; AC coupled.
Frequency Response:	20 Hz to 5.0 MHz +/- 3dB.
Dispersion Removal:	40 dB (measured).
Output Level:	1.0 Vp-p (internally adjustable; 140 +/-10 IRE).
Signal to Noise:	47 dB minimum (weighted; 16 dB C/N, 107 MHz peak deviation).
Polarity:	Normal, sync tip negative (programmable).
Connectors:	Phono plug.

3.2 Video II Output

Video Signal:	Clamped or unclamped (internally switched), filtered, de-emphasized.
Output Impedance:	75 ohms.
Output Level:	1.0 Vp-p (internally adjustable).
Frequency Response:	20 Hz to 9.0 MHz.
Chrominance Luminance Delay Inequality:	+/- 25 nsec
Differential Gain:	7% p-p (maximum).

3.3 Decoder Outputs

Connectors:	BASEBAND and MAC phono plugs.
Video Signal:	Unfiltered, unclamped, non de-emphasized.
Output Impedance:	75 ohms.
Frequency Response:	20 Hz to 10.00 MHz.

4.0 AUDIO

Signal Format:	Frequency Modulation.
Operating Modes:	Monaural or discrete stereo.
Bandwidth:	400 KHz; 280 KHz; 130 KHz; and NARROW (programmable per channel).
De-Emphasis:	J17 (CCIR); 50 uS; 75uS (programmable per channel).
Frequency Response:	20 Hz to 20 KHz.
Subcarrier Frequency Range:	3.8 to 8.7 MHz.
Audio Output Impedance:	< 1000 ohms.
Connectors:	Phono plugs.

5.0 UHF MODULATOR

Output Channel:	Adjustable from channels E31 to E39.
Output Level:	75 dBuV (typical).
Audio:	Monaural.
Intercarrier Sound Frequencies:	PAL B/G and I standards; 5.5 MHz and 6.00 MHz (switchable).
Off-air antenna input:	9.5mm European coaxial connector.
RF Output Receptacle:	9.5mm European coaxial connector.
Test Signal Generator:	Switchable from rear panel. (Two vertical white lines are provided with sync for correct channel alignment of television receivers fitted with sync pulse detection circuits.)

6.0 ACTUATOR INTERFACE

Sensor:	Reed switch or Hall effect.
Connector:	5 terminal barrier strip.

7.0 POLARIZER INTERFACE

Timing pulse range:	800 microseconds to 2200 microseconds.
Pulse Timing Period:	18.5 msec +/- 2.5 msec (nominal).
Power Shutdown:	Three seconds after last pulse timing change.
Connector:	Three terminal push connector.
Ferrite Polarizer Interface:	Optional.

8.0 EXTERNAL ACCESSORY JACK

Output Voltage:	+12 VDC (regulated). Short circuit protected.
Output Connector:	3.5 mm mini jack.

9.0 EXTERNAL INPUTS

Connectors:	Phono plugs.
Maximum Level:	1.0 Vp-p.

10.0 REMOTE CONTROL

Type:	Infrared.
Battery:	9.0 VDC. (Use a battery type such as 6 LR 61).

Unless otherwise noted, above specifications are rated at 25 degrees celsius. In operating temperature ranges between zero and 40 degrees celsius, no noticeable degradation will be observed.

* Note that specifications are subject to change without notice.

Appendix E

Parts List

The following pages show a Bill-Of-Materials (BOM). The products marked with a ⚠ have to be replaced by original components only. Failure to do so can result in further damage to the unit.

⚠ DIE MIT DIESEM SYMBOL GEKENNZEICHNETEN BAUTEILE DURFEN NUR DURCH ORIGINAL BAUTEILE ERSETZT WERDEN.

B I L L O F M A T E R I A L S

Part Number: T777071A

DATE: 04/06/90
PAGE: 1

ITEM	LEVEL	CODE	PART NUMBER	DESCRIPTION	ALTERNATE	QTY
1	00		T777071A	SR5500 SHARP 7702A		1
2	01		T123470	PHILIPS TRUSS SCREW_BLK 6-32-1	/4	4
3	01		T290060	9V 216 BATTERY	29-0036-00-00	1
4	01		T124495	ACCESS TOOL - BLUE PLASTIC	30-3105-00-00	1
5	01		T700010	CAUTION LABEL-CABLE	32-3003-00-00	1
6	01		T700110	RCA CABLE TR V IRD	46-0191-01-00	1
7	01		T700020	SERIAL NO. LABEL	92-3034-00-00	2
8	01		T600020	CARTON SHEET (TRACKER V)	93-3107-00-00	1
9	01		T600030	POLYFOAM RIGHT. TRV IRD	VT# 93-3108-01-00	1
10	01		T600040	POLYFOAM LEFT, TRV IRD	VT# 93-3109-02-00	1
11	01		T600050	POLYFOAM SPACER, TRV IRD	93-3115-00-00	2
12	01		T600060	CARTON COVER TR8	93-3089-00-00	1
13	01		T600070	CARD BOARD TR8	93-3091-00-00	1
14	01		T600080	CARTON SHEET	93-3094-00-00	1
15	01		T600090	POLYBAG	94-0181-00-00	1
16	01		T600100	POLYBAG	94-0198-00-00	3
17	01		T600110	POLYBAG	94-0200-00-00	1
18	01		T600120	NYLON STRAP	97-0001-02-00 UNITS IN CM	100
19	01		T600130	TAPE, PACKING	97-0002-08-00 UNITS IN CM	300
20	01		T600140	5GM SORB-IT DESICCANT	SILICA-GEL	1
21	01		T600150	EXPORT CARTON (TRACKER V)	98-3074-00-00	1
22	01		T777611A	SR5500 PRODUCT ASSY SHARP 7702		1
23	02		T123335	M2.6X4 PH (+) TAPE TILE SCREW	10-0111-00-00	4
24	02		T123410	MACHINE SCREW 4-40-1/4" MSP	10-0132-00-00	4
25	02		T123440	4-40-3/16MS BACK PANEL SCREW	VT# 10-0136-02-00	6
26	02		T124510	4" PLASTIC CABLE TIE,PLTI-M-M	PLT0-8432	14
27	02		T500530	HOT MELT ADHESIVE UL STD.	15-0035-01-00 UNITS IN GRAMS	1
28	02		T124099	IRD BARRIER STRIP COVER	30-3099-00-00	1
29	02		T122380	SR 5500 PLEXI	30-3143-10-00	1
30	02		T120720	TR. VI. VII, VIII FRONT DOOR	VT# 30-3090-00-00	1
31	02		T124470	IRD STRAIN RELIEF	31-3092-00-00	1
32	02		T700270	SR5500 POWER SUPPLY LABEL	92-3132-10-00	1
33	02		T700280	SR5500 WARNING LABEL	92-3232-10-00	1
34	02		T214260A	SR5500 FRONT PANEL ASSY	52-3094-02-00	1
35		03	T123351	M2.6X8 PA (+) NICKEL PLATED	10-0027-02-00 SELF TAPPING	10
36		03	T123400	SCREW_M2.6-6-0.45PH	10-0034-04-00	4
37		03	T123311	#4X5/16" PA(+) NI-PLT	10-0230-00-00	4
38		03	T500560	SCREW LOCKING AGENT	15-0003-00-00 UNITS IN GRAMS	1
39		03	T600160	DYSULAR TAPE 1-S/ADH	16-0221-00-00	50
40		03	T214270	SR5500 FRONT PANEL	30-3142-20-00	1
41		03	T124190	TKR. X KEY KNOB PUSH	30-3144-00-00	1
42		03	T210881	TR VIII FRONT PANEL MTG PLATE	31-3112-00-00	2
43		03	T500510	INSULATION SHEET TR V IRD	32-3117-11-00	1
44		03	T214280A	SR5500 DISPLAY BOARD ASSY	50-3094-04-00	1
45		04	T123072	FIBRA WASHER	11-0070-00-01	2
46		04	T123760	MT. BRAC./SHARP TUNER		2
47		04	T500550	NICKEL WIRE	14-1000-30-00 UNITS IN JUMPERS	45
48		04	T162150	TRANSISTOR PN2222 NPN	VT# 20-1000-01-01	1
49		04	T170910	1N4148 SWITCHING DIODE	VT# 21-0001-00-00	6
50		04	T180520	2200UF 10V ELECT.CAP RADIAL	22-1222-01-03	1
51		04	T181590	.1 UF 50V CERAMIC CAP (F104)	22-3104-18-57	1
52		04	T200100	10 OHM 1/4 WATT +/-5%	23-0011-10-01	1
53		04	T201610	1K 1/4 WATT +/-5%	23-0013-10-01	1
54		04	T202090	100K 1/4 WATT +/-5%	23-0015-10-01	2
55		04	T201740	3.3K 1/4 W +/-5%	23-0332-10-01	1
56		04	T157640	ULN2003 (MC1413) DARLINGTON	27-0192-00-00	2
57		04	T154232	74HC273 HI CUR. FLIP/FLOP	27-0541-02-01 OCTAL D	1
58		04	T176000	INFRARED SENSOR_N/S SRD 3,4,5,6	30-3182-10-00	6
59		04	T214290	SR5500 FRONT	35-3112-11-00	1

B I L L O F M A T E R I A L S
Part Number: T777071A

DATE: 04/06/90
PAGE: 2

ITEM	LEVEL	CODE	PART NUMBER	DESCRIPTION	ALTERNATE	QTY
60		04	T500600	JUMPER CONNECTOR, STRANDED #24	40-0735-00-00 L=65MM	1
61		04	T500610	JUMPER CONNECTOR, STRANDED #24	40-0735-01-00 L=80MM	1
62		04	T260171	TACT SWITCH B3F-4000	42-0117-00-00	5
63		04	T176511	TLR 208 RED LED	43-0134-00-00	6
64		04	T216030A	BEEPER PK M26	52-3025-83-00	1
65		05	T216031	HOUSING BUZZER	30-1234-00-00	1
66		05	T216032	BUZZER BASE	30-1234-01-00	1
67		05	T216033	PIEZO-ELECTRIC TRANSDUCER	28-0002-00-09	1
68		05	T216034	CONTACT PIN-BUZZER	31-0567-00-00	2
69		04	T214300A	SR5500 IR DETECTOR BOARD ASSY	50-3094-03-00	1
70		05	T501541	STRANDED WIRE UL1007 #26 70MM	14-3701-41-14	1
71		05	T212941	SRD 3000 REMOTE RUBBER KEYPAD	32-3113-10-00	1
72		05	T176002	GP1U527 IR DETECTOR	52-3084-10-00	1
73		05	T600682	CABLE ASSY 2 WAY #26 L=300MM	46-0182-01-00	1
74		04	T214310A	SR5500 CPU BOARD	50-3094-05-00	1
75		05	T500570	NICKEL WIRE #22 L=51MM	14-1510-20-00	1
76		05	T501560	WIRE WRAPPING WIRE GREEN #30	14-4000-65-00	6
77		05	T500540	HOT MELT GLUE	15-0071-00-00 UNITS IN GRAMS	1
78		05	T162150	TRANSISTOR PN2222 NPN	VT# 20-1000-01-01	4
79		05	T162600	2SC 192A N CHANNEL JFET TRANS.	VT# 20-0161-00-00	1
80		05	T170910	1N4148 SWITCHING DIODE	VT# 21-0001-00-00	8
81		05	T170499	1N4001 50V/1A DIODE RECTIFIER	VT# 21-0010-00-06	1
82		05	T180251	33 UF 25V ELECT. CAP	22-1330-31-03	1
83		05	T180430	470 UF 10V ELECT. CAP -RADIAL	22-1471-11-03	1
84		05	T180215	22 UF 16V ELECT. CAP RADIAL	22-1220-21-03	1
85		05	T180370	220 UF 16V ELECT. CAP -RADIAL	22-1221-21-03	1
86		05	T182560	10 UF 10V TANTELUM CAP +/-20%	22-2100-11-06	1
87		05	T181200	100PF 50V CERAMIC CAP		1
88		05	T181360	1000PF 50V CERAMIC CAP +/-10%	22-3102-26-58	1
89		05	T181590	.1 UF 50V CERAMIC CAP (F104)	22-3104-18-57	9
90		05	T181150	47PF CERAMIC CAP	22-3470-26-00	1
91		05	T183120	.01 UF 50V MYLAR CAP +/-5% CQ	22-6103-26-01	1
92		05	T181220	150PF 50V CERAMIC CAP	22-6151-75-44	2
93		05	T201610	1K 1/4 WATT +/-5%	23-0013-10-01	1
94		05	T201840	10K 1/4 WATT +/-5%	23-0014-10-01	6
95		05	T206510	1 MEG 1/4 WATT +/-5%	23-0016-10-01	1
96		05	T202110	120K 1/4 WATT +/-5%	23-0124-10-01	1
97		05	T201660	1.6K 1/4 WATT +/-5%	23-0162-10-01	1
98		05	T201690	2.2K 1/4 WATT +/-5%	23-0222-10-01	1
99		05	T206540	2.2 MEG 1/4 WATT +/-5%	23-0225-10-01	1
100		05	T201770	4.7K 1/4 W +/-5%	23-0472-10-01	2
101		05	T201772	4.9K 1/4 WATT +/-5%	23-0492-10-01	1
102		05	T200430	500 OHM 1/4 WATT +/-5%	23-0052-10-01	3
103		05	T202031	50K 1/4 WATT +/-5%	23-0054-10-01	1
104		05	T201800	5.6K 1/4 W +/- 5%	23-0562-10-01	1
105		05	T202450	680K 1/4 WATT +/-5%	23-0681-10-01	1
106		05	T201820	8.2K 1/4 WATT +/-5%	23-0822-10-01	1
107		05	T190031	1K TRIMMER POT-2 TERMINAL	24-2102-05-00	1
108		05	T190140	10K POT-3 PRONG 8MM DIA	VT# 24-2103-01-00	1
109		05	T130060	4M HZ CRYSTAL	VT# 25 3023-00-01	1
110		05	T150520	Z80 MICROPROCESSOR	VT# 27-0132-00-03	1
111		05	T151020	4023 4 BIT UNIVERSAL COUNTER	VT# 27-4023-10-01	1
112		05	T156530	88303 GRAPHICS GENERATOR	VT# 27-0629-00-00	1
113		05	T150370	HM 62256,256-32X8 CMOS RAM	VT# 27-3001-00-12	1
114		05	T157510	GATE ARRAY 01B	27-0846-01-AC	1
115		05	T290020	3V LARGE LITHIUM BATTERY 200MA	29-0035-01-00	1
116		05	T120140	LITHIUM BATTERY HOLDER	30-1247-00-00	1
117		05	T600540	PCB TR V IRD CPU	35-3078-26-00	1
118		05	T120080	28 PIN IC SOCKET	40-0007-00-03	1

BILL OF MATERIALS
Part Number: T777071A

DATE: 08/22/89
PAGE: 3

ITEM	LEVEL	CODE	PART NUMBER	DESCRIPTION	ALTERNATE		QTY
119		05	T600540	PCB TR V IRD CPU	35-3078-26-00		1
120		05	T120080	28 PIN IC SOCKET	40-0007-00-03		1
121		05	T221260	MOLEX 3 POS W/WIRE CONNECTOR	40-0383-03-00		1
122		05	T501270	HEADER 3 PINS .1"	40-0517-03-00	PITCH 22-23-2031	1
123		05	T501280	STRANDED WIRE UL WHITE #26 75MM	14-3750-49-40		1
124		05	T221181	HEADER 40 PIN DUAL ROW 70221	40-0571-40-00		1
125		04	T210616A	DISPLAY BOARD BAR GRAPH			1
126		05	T501080	DIFFUSING TAPE, DIFFER 1-S/ADH	16-0207-00-00		4
127		05	T221175	HEADER 12 PIN (LONG) CONNECTOR	40-0515-12-00		1
128		05	T210615	DISPLAY BOARD BAR GRAPH W/SUBCO	50-3078-13-00		1
129		04	T210611A	DISPLAY BOARD ASSY (7 SEGMENT)	50-3078-07-00		1
130		05	T501090	DIFFUSING TAPE 1-S/ASH	16-0043-04-00		6
131		05	T221111	HEADER 6 PIN DISPLAY CONN.	40-0515-06-00		2
132		05	T210613	DISPLAY BOARD (7-SEG W/SUBCONT	50-3078-11-00		1
133		04	T210612A	DISPLAY BOARD ASSY (14 SEGMENT)	50-3078-08-00		1
134		05	T501090	DIFFUSING TAPE 1-S/ASH	16-0043-04-00		3
135		05	T221111	HEADER 6 PIN DISPLAY CONN.	40-0515-06-00		2
136		05	T210614	DISPLAY BOARD 14-SEG W/SUBCONT	50-3078-12-00		1
137	02		T122761A	SR5500 CHASSIS ASSY SHARP 7702			1
138	03		T123335	M2.6X4 PH (+) TAPE TILE SCREW	10-0111-00-00		1
139	03		T123409	4-40-1/4" MSP ZINC PLATED	10-0130-00-00		3
140	03		T123411	4-40-1/4" MSP BLACK ANODIZED	10-0130-01-00	BLACK ANODIZED	2
141	03		T123459	6-32-3/16" MSP ZINC PLATED	10-0133-00-00		6
142	03		T123430	4-40-3/8 MACHINE SCREW	10-0135-00-00	MSP ZINC PLATED	2
143	03		T123450	4-40-3/16 MSP SCREW	10-0136-00-00	ZINC PLATED	13
144	03		T123460	6-32-1/4 MACHINE SCREW ZINC PLT	10-0163-00-00		4
145	03		T123030	#4 EXTERNAL TOOTH WASHER	11-0043-00-00		17
146	03		T123070	SPRING #6 WASHER	11-0052-00-00		4
147	03		T123032	METAL WASHER 9.8 X 13.5 X .47	11-0075-00-00		2
148	03		T122820	4-40 HEX NUT	12-0023-00-00		2
149	03		T122851	3/8-32X12.7X14.6X2.3MM PIPE NUT	12-0028-00-00	ZINC PLATED	2
150	03		T501740	HOLE PLUG DP-375	13-0051-00-00		2
151	03		T501750	BLIND RIVET	13-0078-00-00		6
152	03		T500560	SCREW LOCKING AGENT	15-0003-00-00	UNITS IN GRAMS	4
153	03		T501551	STRANDED WIRE UL1672 BRW 50MM	14-3051-21-18		1
154	03		T500620	SPONGE-BATTERY	32-3002-00-00		6
155	03		T500680	HEAT TRANSFER COMPOUND HTC010	17-0005-01-00		1
156	03		T500690	HEAT SHRINKABLE TUBE (SUMITOMO)	19-0053-04-04		6
157	03		T500861	PVC TUBING T-105-2 UL/CSA	19-0073-00-00		5
158	03		T500700	ADAPTOR PLATE 815000P	31-0577-00-00		1
159	03		T500720	CASE BOTTOM SR5500	31-3145-21-00		1
160	03		T214330	SR5500 PANEL-REAR	31-3183-10-00		1
161	03		T600160	DYSULAR TAPE 1-S/ADH	16-0221-00-00		6
162	03		T500730	SHIELD CAN .5MM TIN PLT	31-3151-10-00		1
163	03		T500740	TR V IRD COVER SHIELD CAN	31-3152-11-00		1
164	03		T500731	SR5500 BRACKET-SHIELD CAN	31-3200-00-00		2
165	03		T501201	INSULATION SHEET POWER SR5500	32-3200-02-00		1
166	03		T500780	RUBBER STAND (3M SJ-5023) BLK	39-0042-00-00		4
167	03		T500790	SPEAKER TERMINAL 3 PIN PT-SO	40-0527-00-00		1
168	03		T221941	POWER INLET /W RFI FILTER 250V	40-0703-00-00		1
169	03		T500801	SOLDER TAG NO 147	41-0070-00-00		1
170	03		T230060	1 A 250V SLO-BLO FUSE	44-0037-02-00		1
171	03		T230061	3.15A 250V SLO-BLO FUSE	44-0053-00-00		1
172	03		T500820	TR V IRD CABLE ASSY #26 3WAY	52-3078-26-00		1
173	03		T600794	CABLE ASSY UL1672 1 WAY #22	46-0227-00-00	L=55MM	1
174	03		T600795	CABLE ASSY UL1672 1 WAY #22	46-227-01-00	L=65MM	1
175	03		T600796	CABLE ASSY UL1672 1 WAY #22	46-0231-00-00	L=65MM	1
176	03		T501562	STRANDED WIRE UL1007 GRN/YLW	46-0237-00-00	#18 L=50MM	1
177	03		T214360	SR5500 OVERLAY	92-3204-10-00		1

BILL OF MATERIALS
Part Number: T777071A

DATE: 08/22/89
PAGE: 4

ITEM	LEVEL	CODE	PART NUMBER	DESCRIPTION	ALTERNATE		QTY
178		03	T214370A	SR5500 TRANSFORMER ASSY	52-3094-03-00		1
179		04	T500911	STRANDED WIRE UL1007 BRW 280MM	14-3281-21-33		1
180		04	T500861	PVC TUBING T-105-2 UL/CSA	19-0073-00-00		28
181		04	T601070	POWER TRANSFORMER EI-66 IEC65	25-5053-01-00		1
182		04	T221540	2 PIN FEM MOL FRONT TRAN (RED)	40-0586-02-00		1
183		04	T501211	CONNECTOR HOUSING 2 WAY #22	40-0662-04-00	3.96MM	1
184		04	T601060	ALL PLASTIC WIRE CONNECTOR	46-0222-00-00	2X #22	1
185		03	T214330A	SR5500 MAIN BOARD	50-3094-00-00		1
186		04	T500550	NICKEL WIRE	14-1000-30-00	UNITS IN JUMPERS	96
187		04	T501541	STRANDED WIRE UL1007 #26 70MM	14-3701-41-14		3
188		04	T501480	STRANDED WIRE BRW UL1007 100MM	14-3101-41-14		1
189		04	T501490	STRANDED WIRE YLW UL1007 100MM	14-3101-44-14		1
190		04	T501500	STRANDED WIRE BRW UL1007 110MM	14-3111-41-14		1
191		04	T501511	STRANDED WIRE UL1007 YLW 130MM	14-3131-44-40		1
192		04	T501510	STRANDED WIRE BRW UL1007 130MM	14-3131-41-14		1
193		04	T501520	STRANDED WIRE YLW UL1007 180MM	14-3181-44-14		2
194		04	T501530	STRANDED WIRE YLW UL1007 220MM	14-3221-44-14		1
195		04	T501550	STRANDED WIRE BRW UL1007 90MM	14-3900-41-14		2
196		04	T500540	HOT MELT GLUE	15-0071-00-00	UNITS IN GRAMS	1
197		04	T501741	HEAT SHRINKABLE FUE UL224 4MM	19-0074-00-00		17
198		04	T162050	1802N TRANSISTOR	20-0035-02-00		2
199		04	T162160	PN2907 NPN TRANSISTOR	20-0064-01-00		6
200		04	T162150	PN2222 NPN BIPOLAR TRANS. V=30V	20-0065-01-00		16
201		04	T162650	2SC 1740 NPN TRANSISTOR	20-0120-00-00		4
202		04	T162800	3SK74 MOSFET TRANS.	20-0160-00-00		2
203		04	T162600	2SC 192A N CHANNEL JFET TRANS.	20-0161-00-00		2
204		04	T170910	1N4148 SWITCHING DIODE	21-0001-00-00	TAPE AND REEL	22
205		04	T170051	1N4734A ZENER DIODE 5.6V 1 WATT	21-0006-04-00		1
206		04	T170510	1N4002 100V/1A DIODE RECTIFIER	21-0082-00-01		2
207		04	T172075	BB409 VARACTOR DIODE	21-0181-00-00		2
208		04	T180180	10 UF 25V ELECT. CAP -RADIAL	22-1100-31-70		17
209		04	T180310	100 UF 10V ELECT. CAP -RADIAL	22-1101-11-70		2
210		04	T180320	100 UF 16V ELECT. CAP -RADIAL	22-1101-21-70		6
211		04	T180340	100 UF 35V ELECT. CAP -RADIAL	22-1101-41-71		1
212		04	T180351	100 UF 50V 105C ELEC CAP RADIAL	22-1101-61-71		1
213		04	T180470	1000 UF 10V ELECT. CAP -RADIAL	22-1102-11-74		6
214		04	T180090	1 UF 50V ELECT. CAP -RADIAL	22-1109-61-70		7
215		04	T180360	220 UF 10V ELECT. CAP -RADIAL	22-1221-11-70		4
216		04	T180371	220 UF 16V +/-20% F5	22-1221-21-71		1
217		04	T180070	.33 UF 50V ELECT. CAP -RADIAL	22-1338-61-70		2
218		04	T180100	3.3 UF 50V ELECT. CAP -RADIAL	22-1339-61-70		2
219		04	T180260	47 UF 10V ELECT. CAP -RADIAL	22-1470-11-71		2
220		04	T180280	47 UF 25V ELECT. CAP -RADIAL	22-1470-31-71	+/-20% SE SERIAL	1
221		04	T180431	470 UF 10V ELECT. CAP +/-20%	22-1471-11-71		1
222		04	T180130	4.7 UF 25V ELECT. CAP -RADIAL	22-1479-31-71		8
223		04	T181200	100 PF 50V CERAMIC CAP +/-10%	22-3101-26-00		7
224		04	T181360	1000 PF 50V CERAMIC CAP +/-10%	22-3102-26-58		3
225		04	T181540	.01 UF 50V CERAMIC CAP +/-20%	22-3103-28-56		38
226		04	T181596	.1 UF 25V +/-20% SC45F1E104Z-AS	22-3104-18-57		33
227		04	T181551	.015 UF 25V +/-20%	22-3153-17-59		2
228		04	T181262	220 PF 50V +/-10%	22-3221-26-00		3
229		04	T181370	2200 PF 50V CERAMIC CAP +/-20%	22-3222-28-56		2
230		04	T181581	.022 UF +80-20% 50V	22-3223-28-56		2
231		04	T181121	33 PF 50V CERAMIC CAP +/-10%	22-3330-26-00		4
232		04	T181322	470 PF 50V +/-10%	22-3471-26-00		1
233		04	T181390	5000 PF CERAMIC CAP	22-3502-26-00		1
234		04	T181161	56 PF 50V CERAMIC CAP +.-10% SL	22-3560-26-00		2
235		04	T181180	68 PF 50V CERAMIC CAP +/-10%	22-3680-26-00		2
236		04	T181203	100 PF 50V CERAMIC CAP +/-5%	22-4101-25-10	TEMP COMPENSATION	1

BILL OF MATERIALS

Part Number: T777071A

DATE: 08/22/89
PAGE: 5

ITEM	LEVEL	CODE	PART NUMBER	DESCRIPTION	ALTERNATE	QTY
237		04	T181223	150 PF 50V +/-5% TEMP COMPENSAT	22-4151-25-10	6
238		04	T181241	180 PF 50V CERAMIC CAP +/-5%	22-4181-25-10 TEMP COMP	2
239		04	T181070	18 PF 5% CERAMIC CAP	22-4180-25-10	2
240		04	T181081	22 PF 50V CERAMIC CAP +/-5%	22-4220-25-10	2
241		04	T181263	220 PF 50V +/-5% TEMP COMP CAP	22-4221-25-10	2
242		04	T181281	240 PF 50V CERAMIC CAP +/-5%	22-4241-25-11	1
243		04	T181122	33 PF 50V +/-5% TEMP COMP CAP	22-4330-25-10	4
244		04	T181301	330 PF 50V CERAMIC CAP +/-5%	22-4331-25-10	1
245		04	T181030	4.7 PF CERAMIC CAP	22-4479-20-11	2
246		04	T181162	56 PF 50V +/-5% CERAMIC CAP	22-4560-25-10 TEMP COMP	2
247		04	T183150	.1 UF 100V MYLAR CAP +/-10%	22-6104-46-01	4
248		04	T183121	.15 UF 50V MYLAR CAP +/-5%	22-6154-25-03 CQ SERIES	1
249		04	T183253	.0027 UF 100V +/-5% MYLAR CAP	22-6272-45-01	1
250		04	T183090	.0027 UF 100V MYLAR CAP (A-272K	22-6272-46-01	5
251		04	T183019	.047 UF 100V MYLAR CAP +/-5%	22-6473-45-01 TDY SERIES	4
252		04	T200100	10 OHM 1/4 WATT +/-5%	23-0011-10-01	1
253		04	T200230	100 OHM 1/4 WATT +/-5%	23-0012-10-01	7
254		04	T201610	1K 1/4 WATT +/-5%	23-0013-10-01	13
255		04	T201840	10K 1/4 WATT +/-5%	23-0014-10-01	32
256		04	T206660	10K 1/4 WATT METAL FILM +/-1%	23-0014-17-01	1
257		04	T202090	100K 1/4 WATT +/-5%	23-0015-10-01	22
258		04	T206670	100K 1/4 WATT METAL FILM +/-1%	23-0015-17-01	1
259		04	T206510	1 MEG 1/4 WATT +/-5%	23-0016-10-01	3
260		04	T200305	200 OHM 1/4 WATT +/-5%	23-0022-10-01	1
261		04	T201680	2K 1/4 WATT +/-5%	23-0023-10-01	2
262		04	T206680	2K 1/4 WATT METAL FILM +/-1%	23-0023-17-01	1
263		04	T201910	20K 1/4 WATT	23-0024-10-01	2
264		04	T202190	200K 1/4 WATT +/-5%	23-0025-10-01	1
265		04	T200345	300 OHM 1/4 WATT +/-5%	23-0032-10-01	1
266		04	T201617	1.1K 1/4 WATT +/-5%	23-0112-10-01	3
267		04	T201630	1.2K 1/4 WATT +/-5%	23-0122-10-01	1
268		04	T201860	12K 1/4 WATT +/-5%	23-0123-10-01	4
269		04	T200270	150 OHM 1/4 WATT +/-5%	23-0151-10-01	12
270		04	T201640	1.5K 1/4 WATT 5%	23-0152-10-01	5
271		04	T201641	1.5K 1/4 WATT 1% MILL-SPEC.	23-0152-17-01	1
272		04	T201880	15K 1/16 WATT +/-5%	23-0153-10-01	5
273		04	T201660	1.6K 1/4 WATT +/-5%	23-0162-10-01	2
274		04	T201890	16K 1/4 WATT +/-5%	23-0163-10-01	2
275		04	T202141	150K 1/4 WATT +/-5%	23-0154-10-01	2
276		04	T200300	180 OHM 1/4 WATT +/-5%	23-0181-10-01	3
277		04	T201670	1.8K 1/4 WATT +/-5%	23-0182-10-01	5
278		04	T201900	18K 1/4 WATT +/-5%	23-0183-10-01	2
279		04	T200140	22 OHM 1/4 WATT +/-5%	23-0220-10-01	1
280		04	T200310	220 OHM 1/4 WATT +/-5%	23-0221-10-01	3
281		04	T201690	2.2K 1/4 WATT +/-5%	23-0222-10-01	19
282		04	T201920	22K 1/4 WATT +/-5%	23-0223-10-01	2
283		04	T201720	2.7K 1/4 WATT +/-5%	23-0272-10-01	7
284		04	T201940	27K 1/4 WATT +/-5%	23-0273-10-01	4
285		04	T200350	330 OHM 1/4 WATT +/-5%	23-0331-10-01	7
286		04	T201740	3.3K 1/4 WATT +/-5%	23-0332-10-01	6
287		04	T201980	33K 1/4 WATT +/-5%	23-0333-10-01	2
288		04	T200155	39 OHM 1/4 WATT +/-5%	23-0390-10-00	1
289		04	T200393	390 OHM 1/4 WATT +/-5%	23-0391-10-01	2
290		04	T201750	3.9K 1/4 WATT +/-5%	23-0392-10-01	2
291		04	T200160	43 OHM 1/4 WATT +/-5%	23-0430-10-01	1
292		04	T200090	4.3 OHM 2 WATT +/-5%	23-0439-24-00	1
293		04	T200170	47 OHM 1/4 WATT +/-5%	23-0470-10-01	2
294		04	T200420	470 OHM 1/4 WATT +/-5%	23-0471-10-01	4
295		04	T201770	4.7K 1/4 WATT +/-5%	23-0472-10-01	2

B I L L O F M A T E R I A L S
Part Number: T777071A

DATE: 08/22/89
PAGE: 6

ITEM	LEVEL	CODE	PART NUMBER	DESCRIPTION	ALTERNATE		QTY
296		04	T202032	47 K 1/4 WATT +/-5%	23-0473-10-01		9
297		04	T200440	510 OHM 1/4 WATT +/-5%	23-0511-10-01		7
298		04	T201790	5.1K 1/4 WATT +/-5%	23-0512-10-01		6
299		04	T202040	51K 1/4 WATT +/-5%	23-0513-10-01		1
300		04	T200460	560 OHM 1/2 WATT +/-5%	23-0561-10-01		1
301		04	T201800	5.6K 1/4 WATT +/- 5%	23-0562-10-01		17
302		04	T200480	620 OHM 1/4 WATT +/-5%	23-0621-10-01		2
303		04	T202450	680K 1/4 WATT +/-5%	23-0681-10-01		2
304		04	T201810	6.8K 1/4 WATT +/-5%	23-0682-10-01		1
305		04	T202049	68K 1/4 WATT +-5%	23-0683-10-01		1
306		04	T200200	75 OHM 1/4 WATT +/-5%	23-0750-10-01		1
307		04	T200500	750 OHM 1/4 WATT +/-5%	23-0751-10-01		1
308		04	T200500	750 OHM 1/4 WATT +/-5%	23-0751-10-01		1
309		04	T202051	75K 1/4 WATT +/-5% CARBON-FLM	23-0753-10-01		1
310		04	T200220	82 OHM 1/4 WATT +/-5%	23-0820-10-01		1
311		04	T200520	820 OHM 1/4 WATT +/-5%	23-0821-10-01		3
312		04	T201820	8.2K 1/4 WATT +/-5%	23-0822-10-01		7
313		04	T201921	23.7K 1/16 WATT +/-1% METAL FLM	23-2372-37-12		1
314		04	T201922	23.7K 1/4 WATT +/-1% MET-FLM	23-2379-17-01		1
315		04	T200442	511 OHM 1/4 WATT +/-1%	23-5110-17-01		1
316		04	T206700	100K TRIMMER RESISTOR	24-0081-00-00		1
317		04	T190035	1K TRIMMER RES +/-25%	24-2102-00-00		1
318		04	T206710	1M LAY TYPE SEMI FIXED RES	24-2105-00-00		1
319		04	T190025	500 OHM POT - 3 PRONG PLASTIC	24-2501-00-00	9MM DIA	1
320		04	T132220	100 UH CHOKE COIL +/-5%	25-1060-00-00		1
321		04	T132221	CHOKE COIL 1206 100 UH +/-10%	25-1060-02-04		5
322		04	T132222	100 UH CHOKE COIL +/-10%	25-1060-05-04	1205 SERIES	5
323		04	T132030	2.7 UH CHOKE COIL +/-10%	25-1095-01-04		4
324		04	T132070	10 UH CHOKE COIL +/-10%	25-1114-01-04		2
325		04	T132020	2.2 UH CHOKE COIL +/-10%	25-1130-01-04		4
326		04	T132021	2.2 UH CHOKE COIL +/-5%	25-1130-02-04		2
327		04	T132100	22 UH CHOKE COIL +/-10%	25-1153-01-04		2
328		04	T132043	3.9 UH CHOKE COIL +/-10%	25-1179-01-04		2
329		04	T132101	62 UF CHOKE COIL 1205 SER AXIAL	25-1207-00-04		1
330		04	T132300	10.7M QUADRATURE DETECTOR +/-1%	25-2073-00-00		2
331		04	T181601	CERAMIC FILTER SFE 10.7MA 5-A	25-3002-00-00		2
332		04	T181602	CERAMIC FILTER SFE 10.7 MJ	25-3054-00-00		2
333		04	T181603	CERAMIC FILTER 10.7MHZ 450KHZ	25-3054-01-00		2
334		04	T154252	ADC DIP ADC0834CCJ 8BIT +/-LSB	27-0877-00-00		1
335		04	T151840	LM348C LINEAR 6 QUAD NPN OP-AMP	27-0126-00-01		2
336		04	T155320	4051 SINGLE 8 CHAN. MULT/DEMU	27-0286-00-06	CMOS IC	1
337		04	T155310	4053 TRIPLE 2 CHAN MULT/DEMULT	27-0410-00-03		1
338		04	T154910	4052 ANALOG DIFF. 4 CHAN. MULT.	27-0420-00-02		2
339		04	T154251	74HC139N I.C.	27-0506-00-00		1
340		04	T151870	LA1140 FM PLL RADIO TUNING AMP	27-0628-00-00		2
341		04	T151871	SAA 1057 I.C.	27-0630-00-00		3
342		04	T157690	9154 SERIAL VOLUME CONTROL	27-0631-00-00		1
343		04	T152130	LM339 QUAD ANALOG COMPARATOR	27-0634-00-00		1
344		04	T600611	PCB SR550 MAIN CEM3 REV 1.1	35-3114-10-00		1
345		04	T120050	18 PIN IC SOCKET	40-0067-00-04		3
346		04	T221021	HEADER 6 PIN 6373 SERIES	40-0517-06-00		1
347		04	T221813	PIN JACK YKB11-0214 BLK	40-0528-00-00		3
348		04	T221814	RCA PHONE JACK YKB11-0212 RED	40-0528-01-00		2
349		04	T221815	RCA PHONE JACK YKB11-215 YELLOW	40-0528-02-00		2
350		04	T221816	RCA PHONE JACK YKB11-213 WHITE	40-0528-03-00		2
351		04	T221817	D.C. JACK 2MM TC-18-013	40-0559-00-00		1
352		04	T221187	RIGHT ANGLE HEADER 5 P X2.0 1"	40-0570-10-00		1
353		04	T221180	HEADER 12 PIN (6 X 2) CONN.	40-0570-12-00		1
354		04	T221182	20 X 2 PIN .1" PIT (10-88-3401)	40-0570-40-00		1

B I L L O F M A T E R I A L S
Part Number: T777071A

DATE: 08/22/89
PAGE: 7

ITEM	LEVEL	CODE	PART NUMBER	DESCRIPTION	ALTERNATE		QTY
355		04	T221188	RIGHT ANGLE HEADER 6 PIN 3.96	40-0719-06-00		1
356		04	T600680	CABLE ASSY 40 WAYS #26 L=100MM	46-0181-01-00		1
357		04	T600790	CABLE ASSY #26 3 WAY L=180MM	46-0200-02-00		1
358		04	T600850	CABLE ASSY #26 7 WAYS L=190MM	46-0203-01-00		1
359		04	T600860	CABLE ASSY #26 3 WAY L=140MM	46-0228-00-00		1
360		04	T600870	CABLE ASSY #26 8 WAY L=215MM	46-0229-00-00		1
361		04	T600880	CABLE ASSY #26 6 WAY L=180MM	46-0230-00-00		1
362		04	T501141	SLIDE SWITCH SS12F23G5	42-0090-00-00		1
363		03	T214340A	SR5500 POWER BOARD ASSY	50-3094-02-00		1
364		04	T123430	4-40-3/8 MACHINE SCREW	10-0135-00-00	MSP ZINC PLATED	1
365		04	T123071	SHOULDER WASER, NYLON	11-0090-00-00		1
366		04	T122820	4-40 HEX NUT	12-0023-00-00		1
367		04	T500570	NICKEL WIRE #22 L=51MM	14-1510-20-00		2
368		04	T500680	HEAT TRANSFER COMPOUND HTC010	17-0005-01-00		1
369		04	T501120	MICA SHEET TO-220	19-0051-00-00		1
370		04	T162820	MTP-3N80 N-CHANNEL FET TRANS.	20-0163-00-00		1
371		04	T170920	1N4448 SWITCHING DIODE	21-0004-00-00		2
372		04	T170065	1N4736 6.8V/1W ZENER DIODE	21-0019-01-00		2
373		04	T170570	MBR 745 RECTIFIER	21-0052-00-00		1
374		04	T172070	SB140 SCHOTTKY RECTIFIER DIODE	21-0175-00-00		1
375		04	T170600	UF5402 DIODE	21-0176-00-00		1
376		04	T170511	1N4003 200V/1A DIODE	21-0177-00-00		3
377		04	T170575	KBP06M BRIDGE RECTIFIER	21-0178-00-00		1
378		04	T170575	KBP06M BRIDGE RECTIFIER	21-0178-00-00		1
379		04	T170520	1N4006 800V/1A DIODE	21-0192-00-00		1
380		04	T180330	100 UF 25V 85C ELECT CAP-RADIAL	22-1101-31-03		4
381		04	T180341	100 UF 35V ELECT CAP +/-20%	22-1101-41-03		1
382		04	T180361	220 UF 10V +/-20%	22-1221-11-03		3
383		04	T180521	2200 UF 10V +/-20%	22-1222-11-63		1
384		04	T180395	220 UF 200V ELECT. CAP -RADIAL	22-1221-18-62		2
385		04	T180380	220 UF 25V ELECT. CAP -RADIAL	22-1221-31-63		2
386		04	T180432	470 UF 10V +/-20%	22-1471-11-63		1
387		04	T180450	470 UF 35V ELECT. CAP -RADIAL	22-1471-41-63		1
388		04	T181200	100 PF 50V CERAMIC CAP +/-10%	22-3101-26-00		2
389		04	T181521	.001 UF 1000V +/-10%	22-3102-86-04		1
390		04	T181591	.1 UF +80-20% 50V	22-3104-28-57		1
391		04	T182070	.022 UF POLYPROYLEN CAP			1
392		04	T181371	3300 UF 125VAC +/-20%	22-3332-77-05	KC RADIAL	1
393		04	T181321	470 PF 1KV +/-10%	22-3471-86-04		1
394		04	T183110	.01 UF 100V MYLAR CAP +/-5% TDY	22-6103-45-01		1
395		04	T200002	1 OHM 1/4 WATT +/-5%	23-0010-10-01		1
396		04	T201610	1K 1/4 WATT +/-5%	23-0013-10-01		3
397		04	T201840	10K 1/4 WATT +/-5%	23-0014-10-01		2
398		04	T202092	100K 1/2 WATT +/-5%	23-0015-12-01		1
399		04	T206680	2K 1/4 WATT METAL FILM +/-1%	23-0023-17-01		1
400		04	T201732	3K 5 WATT +/-5% WIRE WOUND SQR	23-0033-94-00		1
401		04	T202100	110K 1/4 WATT +/-5%	23-0114-12-01		1
402		04	T200140	22 OHM 1/4 WATT +/-5%	23-0220-10-01		1
403		04	T201710	2.4K 1/4 WATT +/-5%			3
404		04	T200350	330 OHM 1/4 WATT +/-5%	23-0331-10-01		1
405		04	T201800	5.6K 1/4 WATT +/- 5%	23-0562-10-01		2
406		04	T202452	680K 1/4 WATT +/-5%	23-0684-10-01		1
407		04	T201845	10.5K 1/4 WATT +/-5%	23-1052-17-01		1
408		04	T201712	2.49K 1/4 WATT +/-5%			1
409		04	T201713	THERMISTOR, NTC 50 OHM +/-25%	24-1500-00-06	CURRENT 1.1A	1
410		04	T201714	SEMI-VARIABLE RES 1K OHM 1/10W	24-2102-04-00	RVF6P01-102	1
411		04	T134500	10 UH COIL	25-1190-00-00		1
412		04	T134520	18 UH COIL	25-1191-00-00		2
413		04	T134600	40 UH COIL	25-1192-00-00		3

BILL OF MATERIALS
Part Number: T777071A

DATE: 08/22/89
PAGE: 8

ITEM	LEVEL	CODE	PART NUMBER	DESCRIPTION	ALTERNATE		QTY
414		04	T134100	LINE COIL 9.9UH	25-1223-00-00		1
415		04	T201715	SHIELDING BEAD FXC GRADE=3B	25-4046-00-00	3.7X1.2X3.5MM	2
416		04	T501450	FLYBACK TRANSFORMER SHIELDED	25-5044-02-00		1
417		04	T157590	3842N TOTEM POLE CURRENT SENSOR	27-0789-00-00		1
418		04	T501190	HEATSINK CU1.3T TIN-PLT REV 0	31-3242-00-00		1
419		04	T600610	PCB SR5500 POWER FR4 TIN-LEAD	35-3078-61-00	REV 2.2	1
420		04	T221070	HEADER 3 PIN CONNECTOR	40-0575-03-00		1
421		04	T221080	HEADER 4 PIN CONNECTOR	40-0575-04-00		1
422		04	T221110	HEADER 6 PIN CONNECTOR	40-0575-06-00		2
423		04	T221081	HEADER 4 PIN 3.96MM	40-0537-04-00	PITCH 09-65-2048	1
424		04	T221140	HEADER 8 PIN CONNECTOR	40-0575-08-00		1
425		04	T221082	HEADER 3CCT 3.96P (09-67-4032)	40-0661-03-00		1
426		04	T500800	SOLDER TAG NO 148	41-0039-00-00		1
427		04	T501572	STRANDED WIRE UL1007 GRN/YLW	46-0205-02-00	L=100MM	1
428		04	T600690A	CABLE ASSY TR V IRD 6 WAYS	52-3078-18-00	L=380MM	1
429		05	T500870	STRANDED WIRE BLK UL1007 L=380M	14-3381-00-91		1
430		05	T500880	STRANDED WIRE BRW UL1007 L=380M	14-3381-01-91		1
431		05	T500890	STRANDED WIRE RED UL1007 L=380M	14-3381-02-91		1
432		05	T500900	STRANDED WIRE ORG UL1007 L=380M	14-3381-03-91		1
433		05	T500910	STRANDED WIRE GRN UL1007 L=380M	14-3381-05-91		1
434		05	T500920	STRANDED WIRE BLUE UL1007	14-3381-06-91	L=380MM	1
435		05	T501330	CONNECTOR HAUSING 6 PINS 3.96MM	40-0586-06-00	PITCH 09-06-0068	2
436		04	T600830A	CABLE ASSY TR V IRD #18 3 WAYS	52-3078-24-00	L=220MM	1
437		05	T500930	STRANDED WIRE BLK UL1007 220MM	14-3221-00-91		1
438		05	T500940	STRANDED WIRE BRW UL1007 220MM	14-3221-01-91		1
439		05	T500950	STRANDED WIRE YLW UL1007 220MM	14-3221-04-91		1
440		05	T501210	CONNECTOR HOUSING 3 PIN 3.96MM	40-0662-03-00	PITCH 09-06-0038	2
441		04	T600700A	CABLE ASSY TR V IRD #18 3 LOOPS	52-3078-34-00		1
442		05	T501220	STRANDED WIRE BLK UL1007 #18	14-3400-00-91	L=40MM	3
443		05	T501230	CONNECTOR HOUSING 8 PIN 3.96MM	40-0586-08-00	PITCH 09-06-0088	1
444		03	T210600A	TR. V IRD RELAY BOARD	50-3078-04-00		1
445		04	T501570	HEAT SHRINKABLE TUBE DIA 2MM	19-0053-02-02		3
446		04	T162050	1802N TRANSISTOR	20-0035-02-00		1
447		04	T162160	PN2907 NPN TRANSISTOR	20-0064-01-00		1
448		04	T161100	TIP-32 V=80 POWER TRANS TC=.32W	20-0175-00-00		1
449		04	T170910	1N4148 SWITCHING DIODE	21-0001-00-00	TAPE AND REEL	1
450		04	T170515	1N4004 400V/1A GEN. PURPOSE REC	21-0012-00-05		2
451		04	T170070	1N4737 7.5V/1W ZENER DIODE	21-0060-01-03		1
452		04	T170510	1N4002 100V/1A DIODE RECTIFIER	21-0082-00-01		2
453		04	T234030	56V MOV METAL OXIDE VARISTOR	21-0084-00-00		3
454		04	T233050	BZW 0412 12.1V 18.2A TRANSORB	21-0095-00-01		4
455		04	T170580	BPC2502 200V/25A BRIGDE RECT.	21-0100-00-01	(NEW)	1
456		04	T234040	66V MOV METAL OXIDE VARISTOR	21-0214-00-00		1
457		04	T180480	1000 UF 16V ELECT. CAP -RADIAL	22-1102-21-48		1
458		04	T180090	1 UF 50V ELECT. CAP -RADIAL	22-1109-61-70		1
459		04	T181540	.01 UF 50V CERAMIC CAP +/-20%	22-3103-28-56		3
460		04	T181545	.01 UF 1000V CER. DISC CAP	22-3103-88-04		1
461		04	T181591	.1 UF +80-20% 50V	22-3104-28-57		1
462		04	T181596	.1 UF 25V +/-20% SC45F1E104Z-AS	22-3104-18-57		2
463		04	T200010	1 OHM 10 WATT +/-5% WIRE WOUND	23-0010-94-00		1
464		04	T201610	1K 1/4 WATT +/-5%	23-0013-10-01		1
465		04	T201840	10K 1/4 WATT +/-5%	23-0014-10-01		2
466		04	T200305	200 OHM 1/4 WATT +/-5%	23-0022-10-01		1
467		04	T201820	8.2K 1/4 WATT +/-5%	23-0822-10-01		3
468		04	T200260	120 OHM 1/2 WATT +/-5%	23-0121-12-01		2
469		04	T200320	240 OHM 1/4 WATT +/-5%	23-0241-10-02		1
470		04	T200150	33 OHM 1/4 WATT +/-5%	23-0330-10-01		1
471		04	T200411	430 OHM 1/2 WATT +/-5%	23-0431-12-01		1
472		04	T201770	4.7K 1/4 WATT +/-5%	23-0472-10-01		1

BILL OF MATERIALS

Part Number: T777071A

DATE: 08/22/89
PAGE: 9

ITEM	LEVEL	CODE	PART NUMBER	DESCRIPTION	ALTERNATE		QTY
473		04	T206561	4.7 MEG 1/2 WATT	23-0475-12-01		2
474		04	T157640	ULN2003 (MC1413) DARLINGTON	27-0192-00-00		1
475		04	T160070	7806 VOLT. REG +6V/1A VIN:9-35V	27-0350-00-03		1
476		04	T501250	TR V IRD BRACKET-RELAY BOARD	31-3164-00-00		1
477		04	T600600	PCB TR V IRD RELAY FR4 TIN-LEAD	35-3078-73-00	REV 2.1	1
478		04	T501260	WAFER W/LOCK STRAIGHT 2 PIN	40-0383-02-00	3.96 PITCH MOLEX	2
479		04	T501270	HEADER 3 PINS .1"	40-0517-03-00	PITCH 22-23-2031	2
480		04	T221112	HEADER 6 PIN TR. V IRD	40-0571-12-00		1
481		04	T501290	RELAY DC 12V DPDT 30VDC-10A	44-0042-00-00		2
482		04	T600710	CABLE ASSY TR V IRD #26 12 WAYS	46-0192-00-00	L=250MM	1
483		04	T170050	1N4734 5.6V/1W ZENER D. (Z 5.6)	21-0006-00-03		1
484	03		T210623A	TR V IRD BARRIER STRIP BOARD	50-3078-09-00		1
485		04	T500590	HOT MELT STICK AA8301	15-0071-02-00		2
486		04	T600570	PCB TR VIII BARRIER STRIP	35-3025-46-00	5 PIN 71505-C-V50	1
487		04	T501340	BARRIER STRIP 5 PIN 71505-C-V50	40-0403-05-00		1
488		04	T600740	CABLE ASSY TR V IRD #26 3 WAYS	46-0180-02-00	L=240MM	1
489		04	T600750A	CABLE ASSY TR V IRD #18 2 WAYS	52-3078-27-00	L=200MM	1
490		05	T501020	STRANDED WIRE BLK UL1007 200MM	14-3201-00-90		1
491		05	T501030	STRANDED WIRE RED UL1007 200MM	14-3201-02-90		1
492		05	T501350	CONNECTOR HOUSING 2 PINS 3.96MM	40-0662-02-00	PITCH 09-06-0028	1
493	03		T210541A	TRV SHARP 7702A TUNER			1
494		04	T123336	M2 6X5 PH (+)	10-0063-00-00		2
495		04	T123033	EXTERMAN TOOTH WASHER ,STL	11-0088-00-00	DIA 5.7X2.7X.3T	2
496		04	T123710	TUNER #1 BRACKET	31-3149-00-00		1
497		04	T501150	TURO BLOCK TUNER/DEMOD BSF-7701	49-0005-00-AC		1
498		04	T210548	SHARP 7702H TUNER			1
499		05	T500590	HOT MELT STICK AA8301	15-0071-02-00		2
500		05	T130510	5-50 PF TRIMMER DIODE RECTIFIER	21-0082-00-01		1
501		05	T600550	PCB TR V IRD TURNER/DEMOD	35-3135-11-00	(703127 REV 1.1)	1
502		05	T501160	2 CIRCUIT SHUNT JUMPER 6860G	40-0373-03-00		1
503		05	T221100	HEADER 5 PIN CONNECTOR	40-0694-05-01		1
504		05	T600760	CABLE ASSY TR V IRD #26 10 WAYS	46-0183-01-00	L=80MM	1
505		05	T600770A	CABLE ASSY TR V IRD #18 4 WAYS	52-3078-21-00	L=450MM	1
506		06	T501040	STRANDED WIRE, BLK UL1007 450MM	14-3451-00-90		1
507		06	T501050	STRANDED WIRE BRW UL1007 450MM	14-3451-01-90		1
508		06	T501060	STRANDED WIRE RED UL1007 450MM	14-3451-02-90		1
509		06	T501070	STRANDED WIRE ORG UL1007 450MM	14-3451-03-90		1
510		06	T221591	4 PIN 3.96MM PITHC (09-06-0048)	40-0586-04-00		1
511	03		T214350A	SR5500 MODULATOR BOARD ASSY	50-3094-01-00		1
512		04	T600900	SR5500 MODULATOR	35-3115-10-00		1
513		04	T501280	STRANDED WIRE UL WHITE #26 75MM	14-3750-49-40		1
514		04	T500651	PVC TUBE UL AWG #18 CLEAR	19-0015-00-00		2
515		04	T600171	SR5500 BRACKET EGS .8T REV 0	31-3184-10-00		2
516		04	T122761	MODULATOR UHF W/ MIX BOOSTER	52-3094-01-00		1
517		04	T501143	SLIDE SWITCH SK SER 4P2T	42-0157-00-00		1
518		04	T162150	PN2222 NPN BIPOLAR TRANS. V=30V	20-0065-01-00		2
519		04	T162160	PN2907 NPN TRANSISTOR	20-0064-01-00		1
520		04	T180170	10 UF 16V ELECT. CAP -RADIAL	22-1100-21-70		2
521		04	T180260	47 UF 10V ELECT. CAP -RADIAL	22-1470-11-71		2
522		04	T180433	470 UF 10V +/-20%ELECT CAP	22-1471-11-44		1
523		04	T181050	10 PF 50V CERAMIC CAP +/-5%	22-3100-21-43		1
524		04	T181596	.1 UF 25V +/-20% SC45F1E104Z-AS	22-3104-18-57		1
525		04	T181082	22 PF 50V +/-5% CERAMCIC CAP	22-3220-25-49		1
526		04	T181203	100 PF 50V CERAMIC CAP +/-5%	22-4101-25-10	TEMP COMPENSATION	2
527		04	T181122	33 PF 50V +/-5% TEMP COMP CAP	22-4330-25-10		4
528		04	T181160	56 PF 50V CERAMIC CAP (H560J)	22-4560-25-00		2
529		04	T181181	68 PF 50V +/-5% TEMP COMP CAP	22-4680-25-10		2
530		04	T200230	100 OHM 1/4 WATT +/-5%	23-0012-10-01		1
531		04	T201610	1K 1/4 WATT +/-5%	23-0013-10-01		1

BILL OF MATERIALS
Part Number: T777071A

DATE: 08/22/89
PAGE: 10

ITEM	LEVEL	CODE	PART NUMBER	DESCRIPTION	ALTERNATE		QTY
532		04	T201680	2K 1/4 WATT +/-5%	23-0023-10-01		1
533		04	T200310	220 OHM 1/4 WATT +/-5%	23-0221-10-01		1
534		04	T200150	33 OHM 1/4 WATT +/-5%	23-0330-10-01		1
535		04	T200350	330 OHM 1/4 WATT +/-5%	23-0331-10-01		2
536		04	T200393	390 OHM 1/4 WATT +/-5%	23-0391-10-01		1
537		04	T200420	470 OHM 1/4 WATT +/-5%	23-0471-10-01		1
538		04	T200440	510 OHM 1/4 WATT +/-5%	23-0511-10-01		2
539		04	T200480	620 OHM 1/4 WATT +/-5%	23-0621-10-01		1
540		04	T201840	10K 1/4 WATT +/-5%	23-0014-10-01		1
541		04	T201880	15K 1/16 WATT +/-5%	23-0153-10-01		2
542		04	T201714	SEMI-VARIABLE RES 1K OHM 1/10W	24-2102-04-00	RVF6P01-102	1
543		04	T132060	8.2 UH CHOKE COIL +/-10%	25-1096-00-10		2
544		04	T132070	10 UH CHOKE COIL +/-10%	25-1114-01-04		2
545		04	T501142	SLIDE SWITCH 1P2T	42-0144-00-00		1
546		04	T600881	CABLE ASSY 6 WAY #26 L=100MM	46-0220-00-00		1
547	01		T777620A	TR5500 REMOTE TX W/29 KEYS	85-3094-02-00		1
548	02		T123351	M2.6X8 PA (+) NICKEL PLATED	10-0027-02-00	SELF TAPPING	10
549	02		T123339	M2X6 PT(+) SELF TAPPING SCREW	10-0053-00-00		2
550	02		T500632	JUMPER WIRE #25 L=10MM TIN-PLT	14-1100-30-14		3
551	02		T500633	JUMPER WIRE #25 L=12MM NICKEL	14-1120-30-14		1
552	02		T500560	SCREW LOCKING AGENT	15-0003-00-00	UNITS IN GRAMS	1
553	02		T120689	SR5500 CABINET TOP REMOTE	30-3145-22-00		1
554	02		T213093	SRD 3000 REMOTE CABINET BOTTOM	30-3146-10-00		1
555	02		T122271	TR V IRD PLEXIGLASS	30-3147-10-00		1
556	02		T213095	SRD 3000 REMOTE BATTERY DOOR	30-3148-10-00		1
557	02		T500620	SPONGE-BATTERY	32-3002-00-00		1
558	02		T214350	SR5500 FUNCTION PLATE	32-3058-30-00		1
559	02		T124170	TR. VIII MAIN RUBBER KEYPAD	32-3060-00-00		1
560	02		T124180	RUBBER PAD REMOTE VC TR VIII	32-3062-00-00		1
561	02		T214340	SR5500 PLATE VC	32-3064-20-00		1
562	02		T500640	FOOT #SJ-5816 (BLACK)	39-0005-00-00		4
563	02		T700100	DATE CODE LABEL	92-3035-00-00		1
564	02		T213072	SRD 3000 IRD BLANK PLATE	92-3104-10-00		1
565	02		T212940A	SRD-3000, 5000 REMOTE BOARD	50-3084-04-00		1
566		03	T600520	PCB TR VIII REMOTE KEYBOARD TX	35-3025-42-00		1
567		03	T162160	PN2907 NPN TRANSISTOR	20-0064-01-00		1
568		03	T162150	PN2222 NPN BIPOLAR TRANS. V=30V	20-0065-01-00		1
569		03	T180370	220 UF 16V ELECT. CAP -RADIAL	22-1221-21-03		1
570		03	T180131	4.7 UF 25V ELECT. CAP -AXIAL	22-1479-31-03		1
571		03	T181592	.1 UF 50V +80-20%	22-3104-28-70		1
572		03	T183131	.022 UF50V MYLAR RADIAL +/-5%	22-6223-25-03		1
573		03	T183140	.056 UF 100V MYLAR CAP (A563K)	22-6563-26-03	+/-10%	1
574		03	T181522	.001 UF 50V 80-20% CERAMIC CAP	22-3102-28-56		1
575		03	T200223	100 OHM 1/4 WATT +/-5%	23-0012-10-02		1
576		03	T201612	1K 1/4 WATT +/-5%	23-0013-10-02		1
577		03	T201631	1.2K 1/4 WATT +/-5%	23-0122-10-02		1
578		03	T201861	12K 1/4 WATT +/-5%	23-0123-10-02		1
579		03	T202041	51K 1/4 WATT +/-5%	23-0513-10-02		2
580		03	T190180	20K TRIMMER POT - PLASTIC BLUE	3 PRONG 10MM DIA		1
581		03	T154410	SL-490 KEY ENCODER	27-0345-00-00		1
582		03	T700200	PCB SRD 5000 IRD REMOTE TX MAIN	35-3103-10-00		1
583		03	T124540	9V BATTERY SNAP	40-0031-09-00		1
584		03	T500630	JUMPER CONNECTOR L=12MM	40-0569-00-00		1
585		03	T176560	KLR 208E RED LED	43-0134-00-00		1
586		03	T176001	GL521 IR EMITTER	43-0184-00-00		1